The MDP Engineer's Desktop and Library

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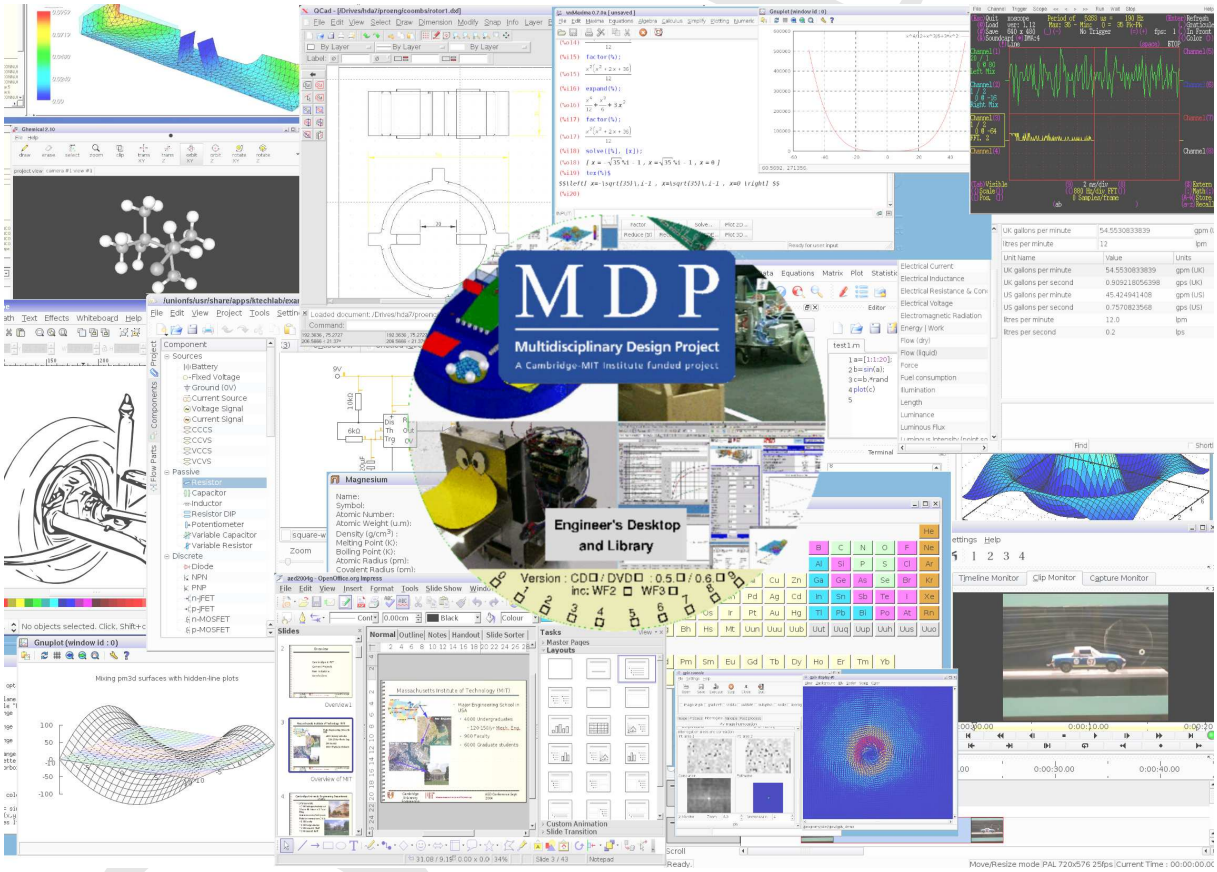
www-mdp.eng.cam.ac.uk/

MDP
Multidisciplinary Design Project



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I. MDP Engineers Desktop and Library

I.1 Introduction

The EDaL system has been developed to meet a number of needs that arose during the MDP development, in particular the requirement to give students access to standard engineering and office software packages, actual engineering data/data-sheets and text books. It was found that in many cases the cost to students, and in some cases institutions, was a significant barrier to attempting projects. In an attempt to help with the problem a number of solutions where investigated but most were rejected due to difficulties relating to cost, installation or maintenance issues. The solution described here has been a development over a number of years, being tested with students, engineers and on a distributed computing network in Cambridge University.

Based on a Knoppix Linux bootable Live DVD distribution the system has been designed to try and satisfy a number of specific requirements raised in the study, notably:

- Easily accessible engineering design and analysis software
- Engineering data & textbooks
- Zero or Low ownership cost
- Ease of operation
- Standard Interface to simplify learning and generation of hand-outs/tutorials etc.
- Low overhead operating system and user interface to maximise the cpu power available to applications.
- Access to main stream management tools, inc word processing, presentation and project planning software.

I.1.1 How to use EDaL system?

There are many ways the user may wish to use the resources and there are no prescriptive modes of operation, however some of the possibilities are described below.

'Dip-in resources — At the lowest level the system can simply be used to provide the user with an easily accessible library of engineering data, text-books and monographs. The method of decompressing the data on the fly (see section I.1.3) combined with the data being held locally means that the data is quick to access and browse.

Specific analysis — A user faced with a specific problem for which they do not have suitable software may wish to use one or more of the pre-installed packages and documentation to solve a problem

Main working environment — The EDaL system has been constructed to have all the standard software required for an engineer or student's day-to-day work. Thus it can be used as a replacement for the more standard commercial operating/desktop offerings.

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Transportable System Especially when installed on a USB stick the system is easily transported and while giving a user access to all their standard applications and certain amount of data at the reboot of a normal PC, see section II.2.2.

Network solution In the situation were a number of computers need to run the EDaL system, they can be setup to download the operating system and applications across a network from one image of the EDaL system, thus simplifying updates and minimising hacking/virus issues.

I.1.2 What can it do

As noted above the EDaL system has been assembled to give a fairly complete working environment for a engineer. It has a relatively standard user interface giving menu access to desktop/multimedia applications, engineering design/analysis packages and a library of useful data. The table below shows some of the applications that have been included that give similar functionality to those found in Microsoft Windows, more details on individual applications and resources are give in sections III, IV, V.

MS Windows		*EDaL*	Section	*MS Windows*		*EDaL*	Section
Office				**Scientific**			
Word	↔	Writer	III.6.1	MATLAB	↔	Octave	III.9
Excel	↔	Calc	III.6.1	Origin	↔	SciDavis	III.12
Powerpoint	↔	Impress	III.6.1	Mathematica	↔	wxMaxima	III.12
Internet				**Media**			
Internet Explorer	↔	Iceweasel	III.3	Photoshop	↔	gimp	III.5
				Media Player	↔	VLC	III.5
Eudora	↔	Icedove	III.3				

In addition there are some teaching resources in the form of presentation slides etc to cover some of the material that may be needed for students undertaking multidisciplinary projects.

I.1.3 How does it work?

The EDaL system is a extremely customised version of the Knoppix Live CD/DVD developed by Klaus Knopper (See VIII.9). The system contains a version of the Linux operating system that can be run on a Intel based PC or MAC without interfering with any of the existing operating systems installed on the computer.

The operating system is the base software that makes a computer useful and the EDaL/Knoppix gives you a full graphical desktop, similar to Windows/Mac OSX, together with networking, sound and a range of pre-installed software. As the software is already configured on the CD/DVD disk (or USB stick) no installation is necessary and no access is required to be made to the existing disks, In fact, the system can run on a computer with no hard disk at all! However, if the user wishes existing disks can be read and written to.

When the user is finished using the system removing the disk/usb stick will allow the PC to boot into the original operating system as normal.

The files on the CD/DVD/USB are stored in a compressed state and decompressed on-the-fly when required. This means that the enhanced version of the EDaL system which typically has $>$ 7GB of software, documentation and reference materials can easily be contained on a DVD or 4GB USB stick and still have $\sim$1.5 GB of space available for user files.

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N.B Although the disk and the included software has been chosen to enable it to be run on low/old machine while still maintaining a reasonable speed it is suggested that a minimum specification for a PC should be:

System Requirements	
Processor	> 400MHz standard apps, >1GHz for computational and graphic intensive applications
Memory	>128M for standard apps, >256M for large applications
Optical drives	> 24x CD (2x DVD) if running from CD or DVD
USB	ideally USB2, USB1.1 will work but can be slower than CD/DVD

The more memory and higher speed your system has the better it will perform, especially when running in an emulator, see section II.2.3.

NB Currently the EDaL system will only run natively on INTEL based *Macs using a CD or DVD or under third party emulation software.

*Currently there is no native solution for the Mac Airbook due to the absence of a optical drive.

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II. Getting Started

As indicated in the Introduction there a a number of ways of using the resources included on the EDaL disk. The following sections outline four of the simplest methods of starting the system running and accessing the applications. Details and links to further information are also given to enable the user to set-up connections to external devices and overcome specific hardware issues.

II.1 How to start the system

If the disk is placed in a drive while the computer is running Microsoft Windows the disc may auto start and present the user with an option screen that gives links to more information about the project and methods to run the software, see Figure 1. (If your optical drive is not set to 'autorun', and the menu has not appeared, view the disk in a Explorer window and click on the MDP-menu or MDP-menu.exe icon)

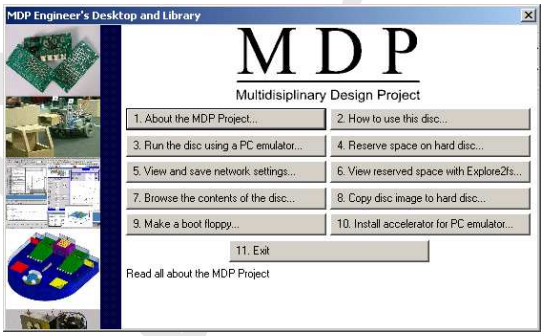
MDP Engineer's Desktop and Library
MDP
Multidisiplinary Design Project
1. About the MDP Project...
2. How to use this disc...
3. Run the disc using a PC emulator...
4. Reserve space on hard disc...
5. View and save network settings...
6. View reserved space with Explore2fs...
7. Browse the contents of the disc...
8. Copy disc image to hard disc...
9. Make a boot floppy...
10. Install accelerator for PC emulator...
11. Exit
Read all about the MDP Project

Figure 1: MDP Option screen seen in Microsoft Windows desktops

1. Access to additional information re. the MDP Project
2. Additional information re. running the EDaL CD/DVD.
3. Running the system under a basic emulator (QEMU). [Section II.2.3]
4. Setting up MDP Reserved Space [Section VIII.4]
5. View and save network settings [Section 3]
6. Read MDP Reserved Space from Windows
7. Open Explorer window to view Disk contents
8. Copy ISO image of CD to hard disc [Section II.2.4]
9. Make a boot floppy [Section II.2.1]
10. Installation of an accelerator for emulator (QEMU) [Section II.2.3]
11. Exit to Windows

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II.1.1 Notes

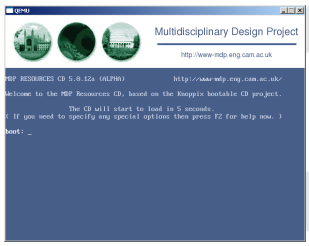
- For simplicity the EDaL CD/DVD/USB disk is described as the 'Disk' in the remainder of this document. In operation the CD and DVD/USB are very similar, with the DVD/USB versions effectively being a superset of the CD with some subject specific applications and/or extended library of resources. Information specific to the DVD/USB or customised CD/DVD/USBs is indicated in the text by DVD ONLY
- If you need further information about the disk please see the project website at www-mdp.eng.cam.ac.uk and the associated user forums.

II.2 Booting methods

Booting is the technical term used to describe the start sequence prior to the user being presented with a usable interface, normally a desktop environment. On most systems this operation is split into two sections the 'bios' during which the core hardware is started and then the installation of the operating system. The EDaL system replaces the normal second stage of this process and attempts to automatically detect the PC configuration and replace the host operating system with Linux obtained from the EDaL media.

N.B. Except when booting from a USB memory device, the EDaL system uses a RAM disc as the users default `/Home` directory. This means that any saved data will be LOST when the system is shutdown unless it is transferred to alternative storage media, see section II.3.4 for details on how to access discs.

II.2.1 Booting from the EDaL Disk (CD/DVD)



This is the standard method of operation. To operate in this mode place the EDaL disk in your optical drive and restart the machine. (Power down and switch on) (N.B. Please ensure that you are using a suitable drive if using the DVD version).

After a few seconds a splash screen should appear offering the user the option to set some specific machine settings. Initially leave these empty as the system should automatically set up your machine. Depending on the speed of the host machine the total boot time will take typically 2-4 minutes during which a series of diagnostic messages will appear on the screen. These can be ignored unless the system hangs in which case please refer to section VIII.2.

Problem: System Reboots into Windows Some machines, particularly older systems, are not automatically setup to boot from an optical drive. In these cases the system will reboot into windows when restarted and possibly display the MDP options menu. Many new machines now allow the user to select the boot media for the current session, often accessed by pressing f12 during the initial boot sequence. If your computer accepts this option, choose the CD/DVD drive option. Alternatively, please refer to the information in section VIII.1.1 and the additional information accessible from item 2 in the options menu with regards to setting the boot sequence.

N.B. on certain machines it may be necessary to initially boot from a floppy disk, this option is also described in the on-line information

At the end of the boot sequence the user is presented with the default MDP desktop and a open web browser containing a page describing some of the standard resources contained on the disk.

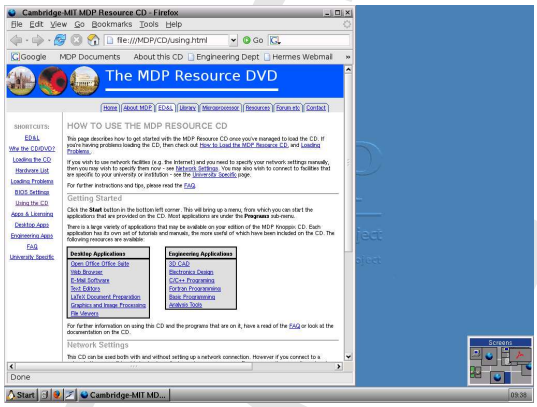

Cambridge-MIT MDP Resource CD - Firefox
The MDP Resource DVD
HOW TO USE THE MDP RESOURCE CD
Getting Started
Network Settings

Figure 2: Initial desktop layout

The EDaL system can be exited using the 'Shutdown' option accessed via the start menu. Ensure the system has fully closed down before removing the power to the computer or data may be lost.

II.2.2 Booting from an USB Memory device

This option is almost identical to 'Booting from EDaL Disk' except that the program is held on a USB stick rather than a CD/DVD. However, the system tends to run faster than a CD/DVD mounted system , especially if the USB port is USB2 compatible. If the USB is large enough the user can store their own files on the same stick and have a truly portable system.

To start, insert the USB memory device into a *socket on the PC and restart the machine. As with the CD/DVD booting option older systems may not automatically boot from USB and therefore it may be necessary to either change the boot sequence options to USB, rather than Hard Disc or CDrom.

If your system does not have an option to select USB as a boot media it is possible to start booting from a EDaL CD/DVD which will automatically detect the USB device and swap. A standard EDaL CD/DVD can be used for this and once the desktop is active the disk can be removed freeing up the optical drive for other uses. (Alternatively there is a option of using a small or credit sized format CD for the initial boot sequence)

* N.B. Some computers have multiple USB sockets not all of which are identical. If your PC fails to boot from the memory stick try the alternative sockets.

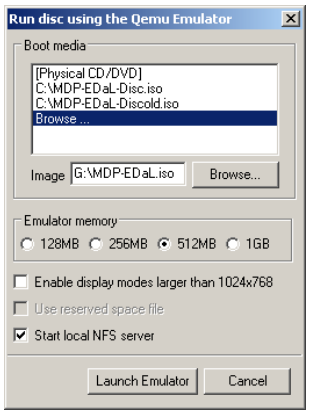
II.2.3 Booting under QEMU emulation (Windows 200/NT/XP/Vista only)

There are a number of ways of running the MDP Desktop under emulation, however all but the disk/usb + QEMU method described here require additional programs to be installed on the users hard disc. (Details of the alternative methods are available on the EDaL disk help area and from the MDP forums)

To operate in this mode insert the disk in to a suitable drive while running Microsoft Windows and when the menu appears select the QEMU option

on the option screen, see Figure 1. (N.B. The more memory allocated to the emulator the better the performance of the emulated system at the expense of the MS Windows performance.)

This will initiate the loading of a software emulator from the disk and then a booting sequence similar to that seen when booting directly from the disk, see Section II.2.1. Depending on the speed of the system, hardware configuration and the amount of memory available this may take a number of minutes (typically $>$5 mins), during which the user can still use the system but it may seem relatively slow.



At the beginning of the sequence the user is offered a few options by a wizard,

1. The 'Image' selection pane allows the user to select the required bootable DVD image. Most users will only have one image, typically on a DVD or USB, which can easily be chosen by selecting *[Physical CD/DVD]*. If the DVD or USB is not seen immediately select *Browse* and navigate to the image *MDP-EDaL.iso*.
2. The emulator speed improves with memory however do not select all the host machine's memory. Typically select up to 128MB or 256 MB less than the host machine's total memory.
3. By default the emulator's maximum window size is 1024x768, however if the host machine has a large screen resolution this can be increased by selecting he tick box.
4. N.B. The 'Use Reserved space file' is currently deactivated
5. NFS Server - if started this gives access to any drives, e.g. C: $\rightarrow$ Z:, mounted in the host system, e.g. hard drives, CDs, USB sticks, network drives etc. Access is via the folder `/Drives/X` where `X` is the drive letter in the host operating system.

   In some cases the system sees empty drives, e.g. card readers, which cannot be mounted immediately. The host system, e.g. Windows, may give a 'Security Alert'. This can be ignored by selecting *'unblock'*

At the end of the booting phase the user is presented with a normal window (adjustable in size) containing the basic EDaL Desktop, see Figure 2.

N.B. When operations are carried out in the Qemu/EDaL window the system locks the mouse to the window, to release it and allow operations on the Windows desktop press the *Ctrl* and *Alt* keys at the same time.

It should be noted that the basic, unaccelerated, version of the QEMU emulator can be very slow, depending on your system setup and memory, and graphic intensive applications/tasks may be awkward to use. Alternative, and potentially faster, commercial emulation options may be available for your computer, please see section VIII.7.

QEMU Acceleration Option 10 in the main menu allows an accelerator for Qemu to be installed which offers a significant increase in the speed of operation of Qemu, however administrator privilege is required to install the package. (Please see your computer support if you do not have administrator access to your machine.)

Installation is automatic and the accelerator should operate next time the EDaL system is run using the Qemu emulator option.

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Additional information about how to run the emulator without the CD installed and options to further enhance the speed can be found on the MDP website.

II.2.4 Booting from an ISO image of the EDaL disk

This option is very similar in operation to 'Booting from EDaL Disk'. The initial boot is from the EDaL disk/USB (or floppy) but once the basic functionality is available the system loads the remainder of the system from an ISO image of the disk held on the host machine's hard disk. (The ISO image is effectively a single 'superfile' which includes all the files held on a optical disk.) It is not possible to directly copy the EDaL disk to a hard drive, however option 8 on the options menu gives a wizard based program which extracts the EDaL system and transfer it to the hard disc. If possible save the files to the top level directory of your preferred drive and note the name of the file, e.g. MDP_resources.ISO.

To use this copy of the EDaL system, the user has to type the following command at the boot window prompt:

knoppix bootfrom=/dev/xdaY/MDP_resources.ISO

where the xdaY refers to the drive the ISO is stored on, (typical values are hda1 - drive C on standard PCs, hda2 - drive C on older Dell systems, sda2 - drive C on new Dell systems). Once the booting has finished the CD can be removed and the drive used for alternative purposes.

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II.3 Desktop and initial setup

The desktop used as standard with the EDaL system is based on FVWM ('F' Virtual Window Manager) which is lightweight but functional windowing manager. It has been selected to minimise the computational load and therefore enable the EDaL system to operate even on old hardware. Direct modification of the user interface has also been limited to ensure that tutorials etc match the look & Feel the user will encounter. Unfortunately, these restrictions mean that some of the more graphic extensive enhancements that can be found in recent desktops environments are currently not available.

II.3.1 Desktop layout

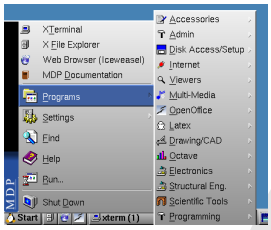
Desktop Icons

As with many modern operating systems the EDaL system allows access to a number of commonly used devices/applications/filing systems from icons on the desktop. However, because the system is often only temporarily installed on a system files are not allowed to be dragged & dropped onto the backdrop so as to minimise the possibility of losing these files on shutdown.

Task bar

The other main area of pre-defined desktop architecture is at the bottom of the screen which contains the main 'Taskbar' which gives direct access to the application menus and the list of active windows as is common on a number of standard windows environments.

Start menu



At the left-hand end of the taskbar is the start button (Start) which gives direct access to all the major applications from a set of cascading menus. The main applications areas are described in the table below with links to the sections which give more details on individual applications

Menu title	Applications
Programs ⇒	
Accessories	General purpose tools, e.g. text editors, calendars, disc utilities. [Section III.1]
Admin	System administration tools, e.g. process monitoring, application killer [Section III.2]
Internet	Internet access applications, browser, email, FTP etc. [Section III.3]
Multi-Media	Applications and tools to process sound, photographic and video files. [Section III.5]
Viewers	Text file format viewers and manipulation, e.g. pdf, postscript [Section III.4]
Openoffice	Access to the Openoffice suite of programs and other DTP related applications. [Section III.6]

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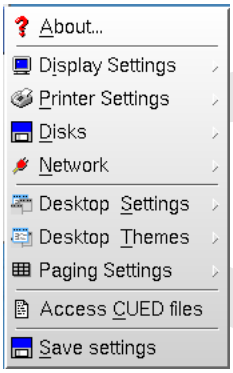
Latex	selection of LaTeXoriented applications giving a full for this powerful scientific text processing system. (LaTeXis the standard package for generating EDaL documentation) [Section III.6.2]
Drawing/CAD	General drawing packages for documentation and presentations graphics together with 2D and 3D CAD applications. [Section III.7]
Project Support	Support applications for undertaking projects including Gantt charting, mind-mapping and advanced white-boarding. [Section III.8]
Octave	Matrix based analysis program (MATLAB syntax compatible) and associated applications and documentation. [Section III.9]
Electronic CAD and Analysis	gEDA suite of EDA tools and a set of simulation and analysis applications [Section III.10]
Simulations	General simulations resource, structural analysis and aircraft emulator. [Section III.11]
Scientific Tools	Standard scientific tools and applications, e.g. data plotting, periodic table symbolic manipulation. [Section III.12]
Programming	Access to the standard programming languages and editors [Section III.13]



Settings ⇒

About	Date and Version number of the EDaL, please quote in all communications.
Display Settings	Controls for the screen resolution and graphics drivers. [See section II.3.2]
Printer Settings	Printer setup routines [See section II.3.3]
Discs	Disc setup utilities, access to network drives [Section VIII.4]
Network	Routines to setup network & wireless cards [Section VIII.5]
Desktop Settings	Simple desktop configuration [See section VIII.6.1]
Desktop Themes	Change window layouts [See section VIII.6.2]
Pager Settings	Configure pager actions [See section II.3.3]
Access XXXX	Direct access to local networked machines. (Only available on certain versions)

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Save Settings	Save desktop settings to disk.

Task Bar Icons

To the immediate right of the start button are icons that give quick access to three of the major desktop applications, file browser, Web browser and OpenOffice. N.B. The exact operation depends on which mouse button is used to select the icon see the table below.

	File Browser (XFE)	Left	-	Opens in **/Home** directory
		Middle	-	Opens in **/Drives** directory
		Right	-	Opens in **/** directory
	Web Browser (Iceweasel)	Left	-	Opens blank web page
		Middle	-	Opens MDP Documentation
		Right	-	Opens Google
	Office Tools (OpenOffice)	Left	-	Opens **Writer** - Word processor
		Middle	-	Opens **Calc** - Spreadsheet
		Right	-	Opens **impress** - Presentation package

Pager (Virtual Desktop)

The desktop manager allows the user to run a number of virtual desktops, e.g. separate 'desks'.

The MDP desktop starts with 9 'desks' active which can be accessed from the pager window at the right end of the task-bar. This contains a miniature image of the open icons on eack of the desks. The currently selected desk is highlighted with a blue background and the active window in green.

Desktop Mouse Operations

The system has some general operations accessible from the mouse while it is over the desktop or individual windows, in particular:

Action	**Operation/program**
	Over the Desktop
Left	Opens **start** menu at the mouse location
Middle	Opens a list of all the open/minimised windows, subsequently selecting an entry with the Left button causes the system to change to the virtual desktop containing the application
	Over a Window
Left (+Select)	Selecting and highlighting a section of text allows it to be copied to a new location by setting the cursor and pressing Middle mouse button

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II.3.2 Setting Screen Resolutions

During booting the EDaL system interrogates the system hardware and attempts to discover the correct graphics card type and screen resolution. Unfortunately, not all graphics cards and/or monitors (inc. laptop screens) return the correct information when probed. The EDaL system will err on the side of safety and default to the highest screen resolution indicated by the hardware. The screen resolution can be reset by either using the

Start ⇒ Settings ⇒ Display Settings ⇒ Change Screen Resolutions

then selecting the desired screen resolution.

If this does not change the resolution a more advanced option can be selected by using

Start ⇒ Settings ⇒ Display Settings ⇒ Advanced Display Settings ⇒ Force Resolution change.

N.B. This will cause any active windows to close and any unsaved data to be lost!

In some cases the fastest graphics driver may not be selected, typically with Nvidia cards when the default open-source software selected in preference to the commercial drivers. Should the user require maximum performance the driver can be changed using

Start ⇒ Settings ⇒ Display Settings ⇒ Advanced Display Settings ⇒ Change Graphics Drivers

and then select the correct driver.

N.B. Should a 'force resolution change' need to be made after a 'change graphics driver' operation has been undertaken the graphics driver may need to be reset again.

II.3.3 Printing

N.B The next section can be skipped over if the user does not require printing immediately

Printing in the EDaL system is controlled by a package called CUPS, which allows both local and remote printers to be accessed. As with most systems the the correct printer and driver must be selected before printing can be initiated. The following section gives a brief overview of how to setup various types of printers, see section VIII.3 for more details.

Selecting a Printer

Local printers: can be setup using the CUPS wizard type interface, via the

Start ⇒ Settings ⇒ Printer Settings ⇒ Configure printer

option. If no printer is automatically detected select the *Administration* tab and then choose *Add Printer* and follow the wizard instructions. Detailed instructions are included in section VIII.3.1.

Networked 'Windows' printers: When using the emulator networked printers are not available.

Networked printers: are automatically mounted if the servers address, e.g. printserver.example.co.uk, is entered at the prompt accessed via ...Configure printer ⇒ Connect to Unix Print Server.

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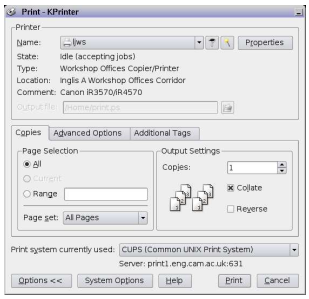

Configuring a printer

By default most applications on the system are setup to use the default printer options and print via the command **lpr**. If more control of the printing operation is required, e.g. double-sided printing, multiple pages etc., the user should erase **lpr** and replace the command with **kpr** which will start the print system with a gui (kprinter). Further information on the use of kprinter can be found in section VIII.3.1.

II.3.4 Disk Access

N.B The next section can be skipped over if the user does not require disk access immediately

The default operation of the EDaL system is not to give the user immediate access to the host machine's disks. However the EDaL system monitors attached disks and all disks that are accessible to the EDaL system can be selected via the desktop icons or the file browser *xfe*. However, when not running in an emulator the disks will normally have to be 'mounted' before they can be accessed. Selecting the icon on the desk top will prompt the user to mount the disk. Alternatively select the disk in the /Drives directory of *xfe* and and use the mount option on the menu accessed by pressing the right mouse button.

The precise method of accessing disks varies depending on the mode in which the EDaL system is being run. The table below gives some details and section VIII.4.1 gives more details on the naming conventions.

EDaL CD/DVD The default users space */Home* is a RAM disk, i.e. its contents are held in the main memory. This mean that

- If large files are written into this area the computer can run out of memory and the EDaL system may become VERY slow.
- When the user shuts down the computer any files/directories will be lost. The data needs to be transferred to permanent storage if the user required it to be saved. N.B A warning window is displayed if data is remaining in the RAM disk at shutdown.

The CD/DVD drives and existing disks in the host computer are visible via the /Drives directory or directly from the desktop, but may need to be mounted before they can be accessed.

Any external drives or USB drives will normally be detected when they are connected however they will normally need to be mounted before they can be accessed.

Network drives will need to be setup using the wizard accessible via

Start ⇒ Settings ⇒ Discs ⇒ Access Local network Drive .

(N.B. If a secure (SSH) link is required to access the remote file server, the 'Access Network Drive (SSH/Remote) can be used provided the correct network server parameters have been entered, see section VIII.4.

EDaL USB The disk access when using a USB memory stick booted environment is very similar to that available when using the CD/DVD boot

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option. However the users home area, `/Home`, is by default saved to the spare space on the USB stick. This means that the files are automatically stored and available to the user at the next boot.

When shutting down the computer it is important that the USB key remains in the machine until the power is off to ensure no data is lost.

EDaL/QEMU When running in the Qemu emulator there is no direct access to the host machines disks unless the 'Run NFS server' option is selected during the start wizard, see section II.2.3. Once the NFS server has been started any disk seen by the windows machine can be accessed via the directory /Drives/C → /Drives/Z corresponding to drives C: → Z:. If a new drive is attached to the host machine while Qemu is running the links will need to be rechecked, by Settings → Discs → Rescan Host Drives.

ISO image Boot The disk access when using this option is identical to that found when using the C/DVD boot option.

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II.3.5 Network/Internet Access

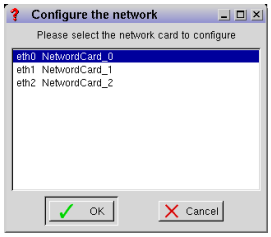
N.B The next section can be skipped over if the user does not require Internet access immediately

If you wish to use network facilities (e.g. view web-pages, check email, connect to your organisation's main computer system) and the system is not running in an emulator, then you may need to configure your network settings.

(N.B. When the EDaL system in an emulator the external connections of the host system, typically Windows, are automatically used).

Wired Internet

If your computer has a a single-wired Internet connection which is connected at boot-up then the EDaL system will attempt to make a automatic connection to the Internet using DHCP, see (1) below. If this fails or there are a number of interfaces in the computer it may be necessary to manually select the interface and/or set the network settings, see (2) & (3) below. If problems still exist see section VIII.5 for more information.



Access to the main network setup routines is via the menus sections ⇒Start ⇒Settings ⇒Network ⇒Network Card.

(N.B. ⇒Start ⇒Settings ⇒Network ⇒Network Interface Info. gives more information on the individual interfaces)

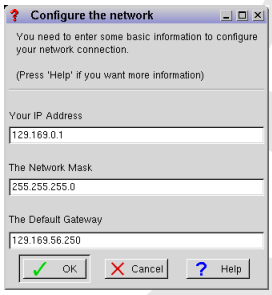
At this point if there is more than one network card the user is prompted to select the one to configure, once selected the system prompts for automatic (DHCP), or manual:-

1. DHCP capable networks

   Some networks can provide information to automatically configure your computer's network settings. This is known as DHCP capability. Many educational establishments offer DHCP as standard and if you are connected to broadband via your computer's Ethernet port, then DHCP is probably available. N.B. Some networks may only allow DHCP access to predefined machines, please see your network manager if this is a problem.

2. Manual setting of network settings

   If you need to configure a network without using DHCP, and you are unwilling/can't run the save network parameters option from the MDP options menu,(section 3), you'll need the following information:



(Example)	192	.	168	.	123	.	10
IP address		.		.		.	
Subnet mask		.		.		.	
Default Gateway		.		.		.	
DNS Name server(s)		.		.		.	
		.		.		.	

Table 3: (Additional copies of this table to record data of commonly connected systems is available on the last page of this document)

Each of the pieces of information will be a sequence of 4 (1,2 or 3 digit) numbers separated by dots, e.g. 192.168.123.100 . You could ask your network administrator for the information, or alternatively use:-

(a) the automatic method outline below

(b) Find them yourself, see section VIII.5 on how to obtain them from a windows session.

3. automatic recording of network settings

   Selecting option 5 from MDP Options menu in the Windows environment records the default settings used by a Microsoft Windows environment to a file, *MDP_NetSetup.dat*, in the top directory of the windows disk or in 'Documents and Settings/All Users' directory. When the the EDaL system is booted the file is read and the network setup automatically to use the same settings as when running Windows.

Wireless connection

Wireless connections from Linux can be difficult especially with new machines as the control software is often withheld by the manufacturers and has to be reversed engineered. However, the EDaL system has been constructed to try and accept most hardware.

The EDaL system has two direct methods of access/setting up wireless cards:

1. A gui application, kwifimanager, which allows the user to search for available wireless points and is accessed via

   ⇒Start ⇒Settings ⇒Network ⇒Wireless Settings

2. A text based access system that allows the mode advanced user to define each of the parameters associated with a wireless card

   ⇒Start ⇒Settings ⇒Network ⇒Wireless

Modems

Details on using internal and external dial-up modems can be found in section VIII.5.3

ADSL The EDaL system works well with most ADSL modem/routers, please see section VIII.5.2 for more details.

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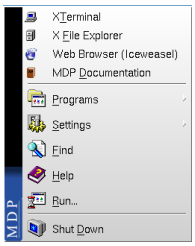
III. Applications



Most of the normally used programs are available from the start menu, accessed via the icon at the left hand end of the task-bar or by pressing the Right Mouse Button over an empty part of the desktop. Four applications are directly available from the top of the menu

Terminal window - [See section III.1]

File browser - [See section III.1]

Web browser - [see section III.3]

access to the MDP Resources.

below which are two cascading menus giving access to grouped programs and setup routines, (See below and the following sections). The final four options have been included for similarity to other operating systems

Find - graphical search application to find contents/names of files and directories. - [See section III.1]

Help - direct access to help about the MDP system

Run - Ability to directly run 'command line' instructions.

Shutdown

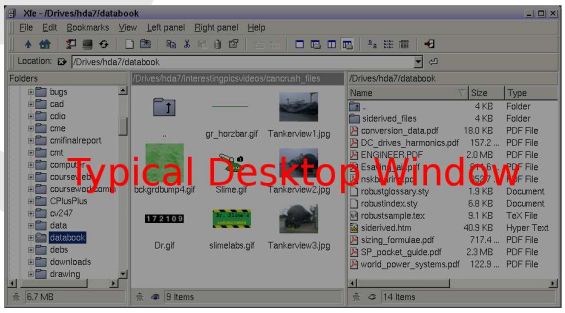
Application Listings. The following sections give a brief description of each of the main applications accessible on the system. Each has an entry in a similar format, e.g.

Menu Icon

name

Home website URL

[Licence]



Brief Description .....

.....

N.B. See Section VIII.10 for more details on the licences under which the software has been developed and is distributed on the EDaL system.

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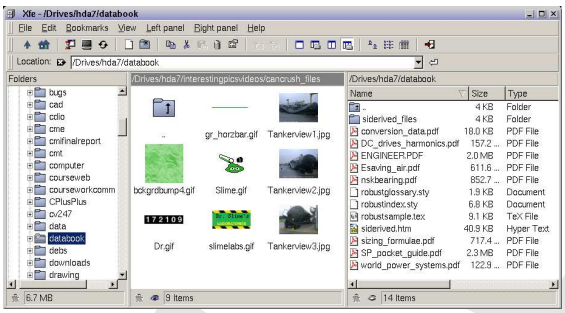
III.1 Accessories

xfe

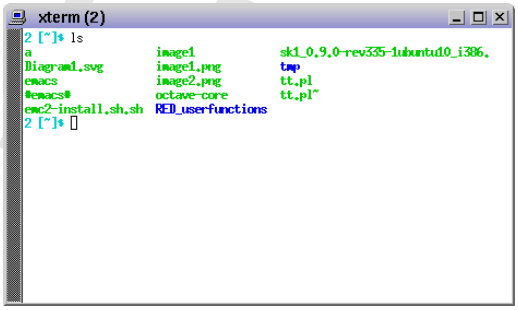
http://roland65.free.fr/xfe/
[GPL]



Xfe is a lightweight and fast file browser, which has similar capabilities to Windows explorer, but in addition has the ability to have multiple panes and launch scripts directly in a directory.

xterm

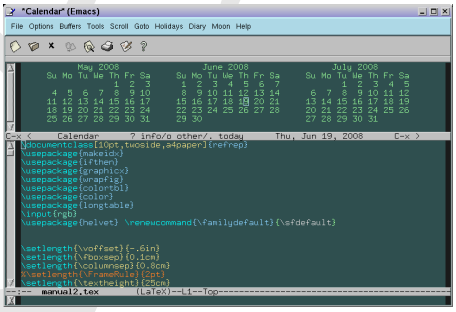
http://invisible-island.net/xterm/xterm.html
[MIT/X Consortium]



The xterm program is a terminal emulator for the X Window System. It provides emulations of industrial standard terminals (DEC VT102 and Tektronix 4014) for programs that can't use the window system directly.

emacs

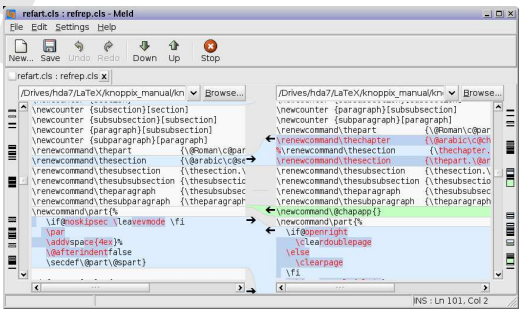
http://www.gnu.org/software/emacs/
[GPL]



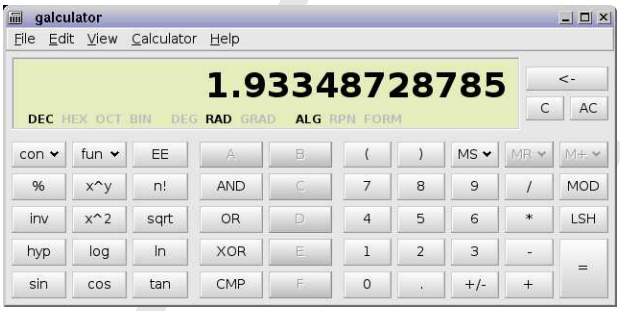
Emacs is a very powerful text editor that has specific modes for most of the applications and programing languages included on the EDaL system. The interface is design to be driven from the keyboard, often making it faster than a mouse driven editor. The full manual and a quick-start guide are included in the applications area.

meld

http://meld.sourceforge.net/
[GPL]



Meld is a visual application that allows the user to compare two or three files and edit them in place (differences between the files are highlighted dynamically). The system also allows the user to compare two or three folders and launch file comparisons.



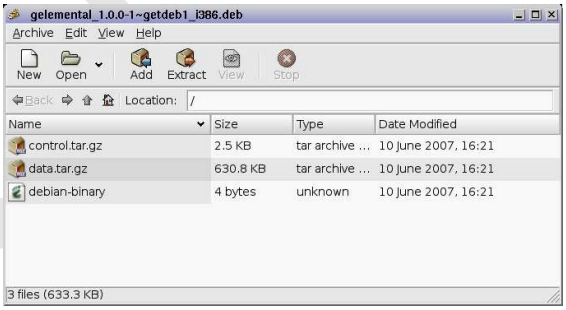
galculator
http://galculator.sourceforge.net/
[GPL]

galculator is a calculator with both algebraic notation and reverse polish notation modes, a formula entry mode, DEC, HEX, OCT, number bases and different units of angular measure (DEG, RAD, GRAD).

StarDict
Clear
GNU
Gnu
Go
go backpacking
go ballistic
go belly-up
go figure
go one on one
go slumming
Go to
<--- dictd_www.dict.org_gcide --->
Gnu
Gnu \Gnu\, n. [Hottentot gnu, or nju: cf. F. gnou.] (Zo["o])
One of two species of large South African antelopes of the genus {Catoblephas}, having a mane and bushy tail, and curved horns in both sexes. [Written also {gnoo}.] [1913 Webster]
Note: The common gnu or wildebeest ({Catoblephas gnu}) is plain brown; the brindled gnu or blue
List
Result
Scan

stardict
http://stardict.sourceforge.net/
[GPL]

Stardict is a cross platform on-line dictionary that can easily accept additional subject specific dictionary files. When running to can give access to the definition of highlighted text on the screen.



fileroller
http://fileroller.sourceforge.net/home.html
[GPL]

File Roller is an archive manager that can

- Create and modify archives.
- View the content of an archive.
- View a file contained in the archive.
- Extract files from the archive.

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Supported file formats (Read/Write) include

Tar archives		lzop	.tar.lzo, .tzo
uncompressed	.tar	Lha archives	.lzh
Compressed with		Rar archives	.rar
gzip	.tar.gz, .tgz	Zoo archives	.zoo
bzip	.tar.bz, .tbz	Arj archives	.arj
bzip2	.tar.bz2, .tbz2	AR archives	.ar
compress	.tar.Z, .taz	Stuffit archives	.bin, .sit

Single files compression (Read/Write)

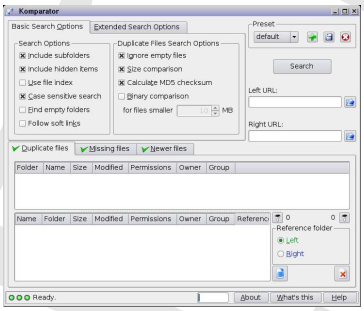
gzip	.gz	compress	.Z
bzip	.bz	bzip2	.bz2
lzop	.lzo		

Read Only Formats

RPM archives	.rpm	Debian archives	.deb
iSO files	.iso		

komparator

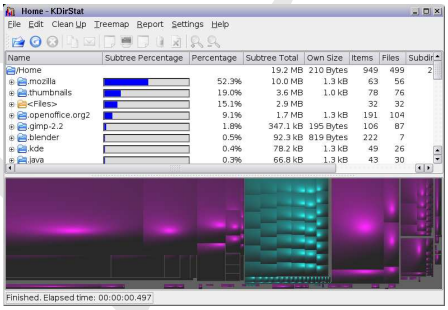
http://komparator.sourceforge.net/
[GPL]



Komparator is an application that simplifies the task of synchronizing two directories, e.g. for backup or copying to/from USB stick. The copying options include copy newer or missing files together with removal of duplicate files/folders and empty folders.

kdirstat

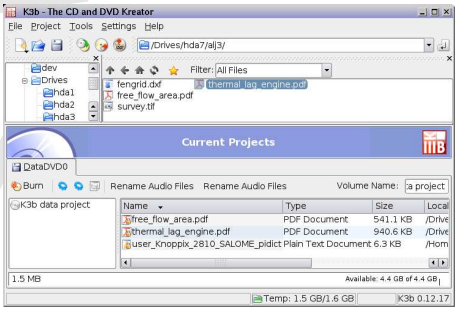
http://kdirstat.sourceforge.net/
[GPL]



KDirStat is a powerful graphical disk usage utility that allows the user to easily see disc usage. Easy access to displays for individual directories and auto launching of individual files.

k3b

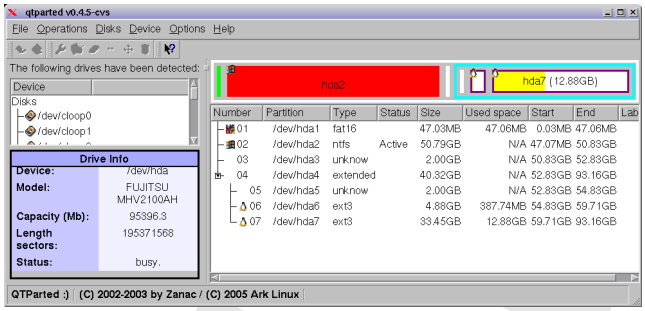
http://www.k3b.org/
[GPL]



k3b is a CD/DVD burning utility that can produce data, music and video format disks. The interfaces is similar to a number of commercial alternatives.

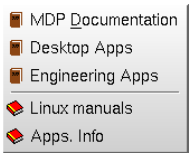
qtparted

http://qtparted.sourceforge.net/
[GPL]


qtparted v0.4.5-cvs
File Operations Disks Device Options Help
The following drives have been detected:
Device
Disks
/dev/cloop0
/dev/cloop1
Drive Info
Device: /dev/hda
Model: FUJITSU MHV2100AH
Capacity (Mb): 95396.3
Length sectors: 195371568
Status: busy.
hda2
hda7 (12.88GB)
Number Partition Type Status Size Used space Start End Lab
01 /dev/hda1 fat16 47.03MB 47.06MB 0.03MB 47.06MB
02 /dev/hda2 ntfs Active 50.79GB N/A 47.07MB 50.83GB
03 /dev/hda3 unknow 2.00GB N/A 50.83GB 52.83GB
04 /dev/hda4 extended 40.32GB N/A 52.83GB 93.16GB
05 /dev/hda5 unknow 2.00GB N/A 52.83GB 54.83GB
06 /dev/hda6 ext3 4.88GB 387.74MB 54.83GB 59.71GB
07 /dev/hda7 ext3 33.45GB 12.88GB 59.71GB 93.16GB
QTParted :) (C) 2002-2003 by Zanac / (C) 2005 Ark Linux

Qtparted is a GUI for parted, which allows the user to partition (split) a disk so as to look like multiple disks. It has interface similar to the commercial package Partion Magic. N.B. This application is run as 'superuser' (see Section VIII.5.5) and can destroy your files. USE WITH CARE!

Manual/info Links



The Manual/info sub-menu gives direct access to a number of the sub-areas of the MDP information website.

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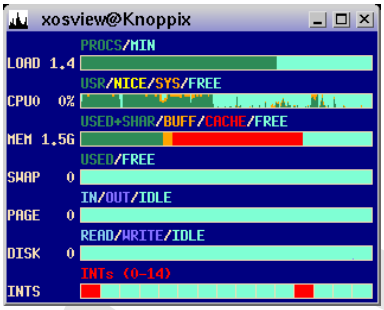
III.2 Admin

Xosview

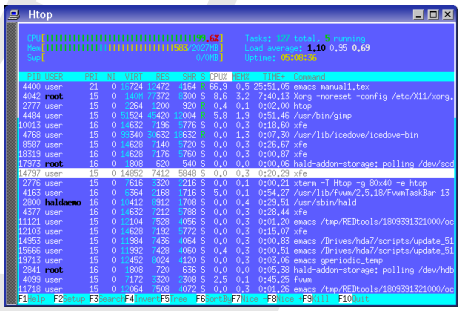
http://xosview.sourceforge.net/
[GPL]



Xosview is a lightweight application that displays the system parameters and cpu load etc for the machine it is running on. The application can be useful to monitor applications and user programs that may be going wrong, e.g. using too much memory or getting into an endless loop. N.B. different types of cpu and memory usage are colour coded.

htop

http://htop.sourceforge.net/
[GPL]



htop, is an interactive process viewer for Linux, that can also be accessed using CTRL + ALT + DELETE. The window displays system status in bar-graph and numeric form at the top of the window and a list of the processes/applications using the most of the system resources ina table below. Individual processes can be selected using $\uparrow$ *or* $\downarrow$ keys and specific information obtained from the function keys. N.B. using <F9> followed by RETURN can be used to kill/end a rogue process.

xkill

http://xosview.sourceforge.net/
[GPL]

Xkill is a small utility program that allows the user to 'kill' or stop a particular program or window, A couple of seconds after selecting xkill from the menu the mouse pointer will change to a 'skull and crossbones'. Moving the pointer over a window and click the left mouse button will cause the window/application to exit.

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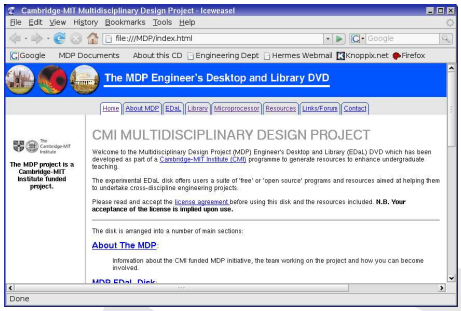
III.3 Internet

Iceweasel

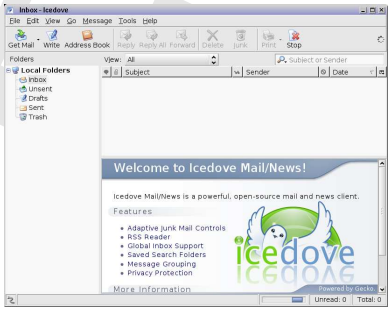
http://packages.debian.org/etch/iceweasel
[LGPL]



Iceweasel is the Debian Linux version of the popular browser Mozilla Firefox, but without the Mozilla branding and trademark. As a direct derivative the system will accept standard Firefox extensions etc.

Icedove

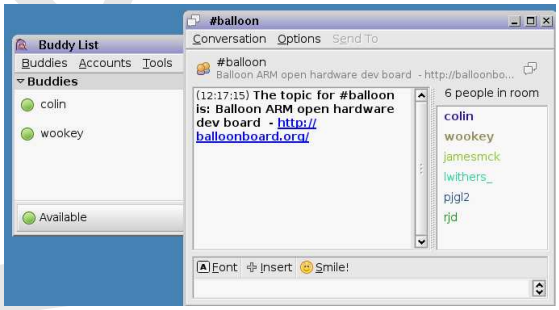
http://packages.debian.org/etch/icedove
[LGPL]



Icedove is a simple e-mail, newsgroup and news feed client derived from the popular Mozilla Thunderbird. iceDove supports POP and IMAP and LDAP address completion. The built-in RSS/Atom reader can also be used as a simple news aggregator.

Pidgin

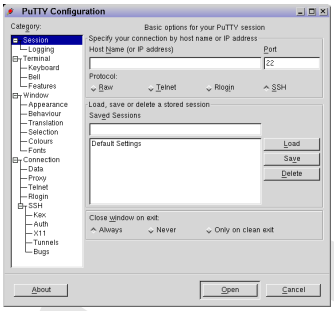
http://www.pidgin.im/
[GPL]



Pidgin is an instant messaging program that works with most of the standard Internet messaging systems, e.g. AIM, ICQ, Jabber/XMPP, MSN Messenger, Yahoo!, Bonjour, Gadu-Gadu, IRC, Novell GroupWise Messenger, QQ, Lotus Sametime, SILC, SIMPLE, MySpaceIM, and Zephyr.

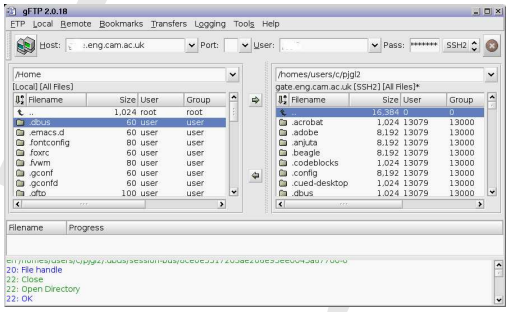
Pidgin can log in to multiple accounts on multiple IM networks simultaneously, e.g. you can chat on AIM, talk on Yahoo Messenger, and sit in an IRC channel all at the same time.

Putty
http://www.chiark.greenend.org.uk/sgtatham/putty
[MIT]



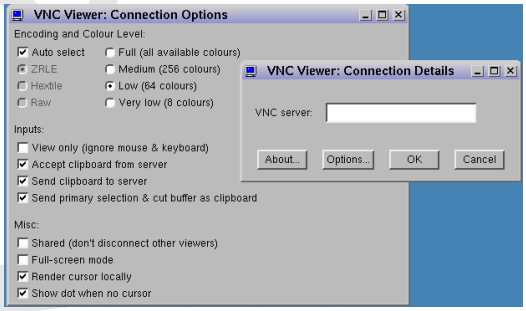
Putty is a powerful SSH, Telnet and Rlogin client, which allows easy remote access to systems,

gFTP
http://gftp.seul.org/
[MIT]



gFTP is a Graphical front end to ftp which allows a simple method of transferring file between computer systems. It is particularly useful if trying to access files on a remote system that does not allow Windows file sharing (Samba) access but does allow SFTP. Also useful if you internet connection is flaky as it allows automatic files transfer restart.

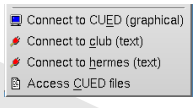
vnc
http://www.realvnc.com/
[MIT]



A graphical front end for launching VNC sessions. VNC is remote control software which allows you to view and fully interact with one computer desktop (the ”VNC server”) using a simple program (the ”VNC viewer”) on another computer desktop anywhere on the Internet. The two computers don’t even have to be the same type, so for example you can use VNC to view a Windows Vista desktop at the office on a Linux or Mac computer at home.

On some versions of the EDaL system location specific internet connection applications and links may be added the bottom of this menu.

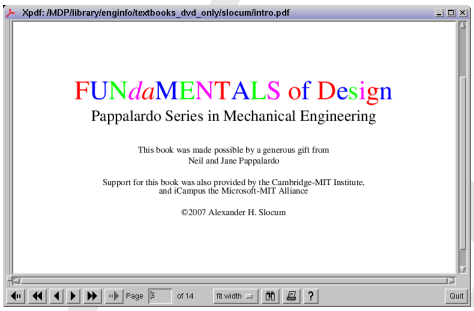
Additional Links



III.4 Viewers

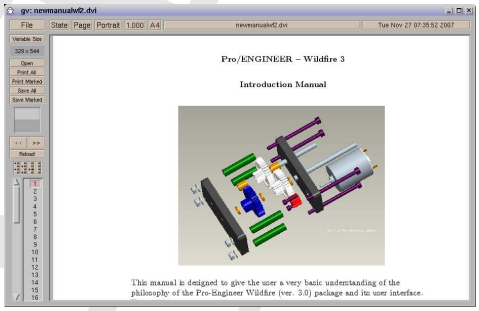
This section contains information on applications related tot he viewing and direct manipulation of standard text formats, e.g. PDF, Postscript.

xpdf
http://www.foolabs.com/xpdf/
[GPL]


Xpdf: /MDP/library/enginfo/textbooks_dvd_only/slocum/intro.pdf
FUNdaMENTALS of Design
Pappalardo Series in Mechanical Engineering
This book was made possible by a generous gift from
Neil and Jane Pappalardo
Support for this book was also provided by the Cambridge-MIT Institute,
and iCampus the Microsoft-MIT Alliance
©2007 Alexander H. Slocum
Page 3 of 14
fit width
Quit

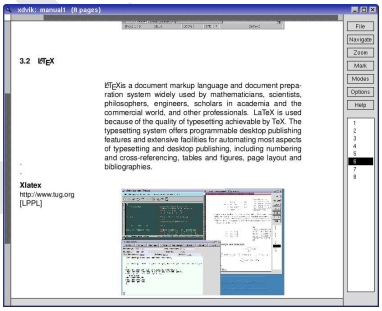
Xpdf is a viewer for Portable Document Format (PDF) files. (These are also sometimes also called 'Acrobat' files, from the name of Adobe's PDF software.) The Xpdf project also includes a PDF text extractor, PDF-to-PostScript converter, and various other utilities.

gv
http://wino.physik.uni-mainz.de/plass/gv/
[GPL]


gv: newmanualw2.dvi
Pro/ENGINEER – Wildfire 3
Introduction Manual
This manual is designed to give the user a very basic understanding of the philosophy of the Pro/Engineer Wildfire (ver. 3.0) package and its user interface.

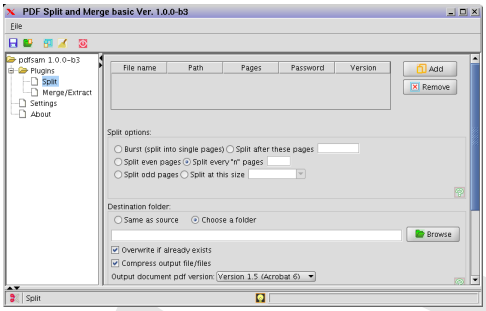
gv is a program to view and navigate through PostScript and PDF documents on an X display, by providing a user interface for the ghostscript (PostScript) interpreter.

xdvik
http://xdvi.sourceforge.net/
[LGPL]


3.2 LaTeX
LaTeX is a document markup language and document preparation system widely used by mathematicians, scientists, philosophers, engineers, scholars in academia and the commercial world, and other professionals. LaTeX is used because of the quality of typesetting achievable by TeX. The typesetting system offers programmable desktop publishing features and extensive facilities for automating most aspects of typesetting and desktop publishing, including numbering and cross-referencing, tables and figures, page layout and bibliographies.
Xlatex
http://www.tug.org
[LPPL]

xdvik is a fast viewer of dvi (DeVice Independant) files as generated by TEXand LATEX, and is used as the default previewer for xlatex and Kile.

pdfsam
http://www.pdfsam.org/
[GPL]



PDF Split and Merge (pdfsam) allows the user to modify existing pdf files e.g. split (into chapters, single pages,etc.), merge pdf documents or subsections, extract sections/single pages. It also has the ability to automate recurrent operations,

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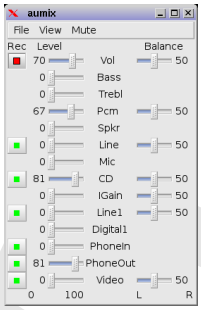
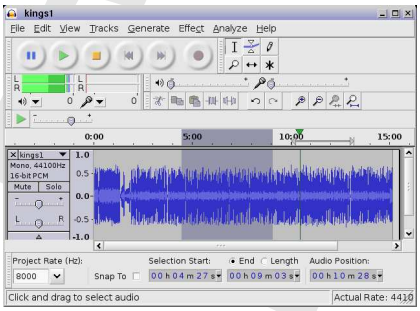
III.5 Multimedia

aumix
http://xdvi.sourceforge.net/
[GPL]



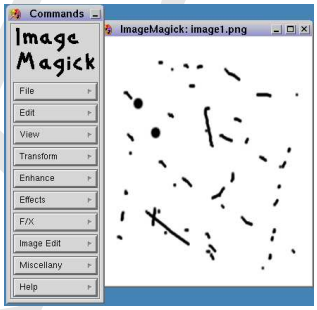
aumix is a simple tool to control the computers audio settings

audacity
http://audacity.sourceforge.net/
[GPL]



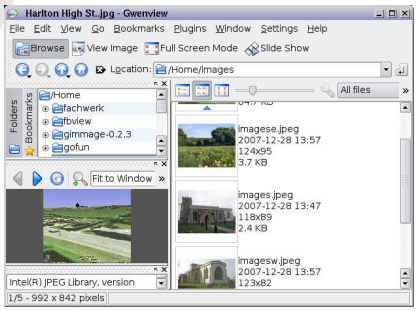
Audacity is a cross platform audio editor and recorder that allows the user to : record live audio; Edit sound files. (e.g. Ogg Vorbis, MP3, WAV or AIFF) ; Cut, copy, splice or mix sounds together; Change the speed or pitch of a recording.

display (Imagemagick)
http://www.imagemagick.org/
[GPL]



display is a subset of the Imagemagick suite of image display/manipulation routine. Display is used as the default image viewer on the system. selecting the image with Right gives access to the main Imagemagick interactive menu.

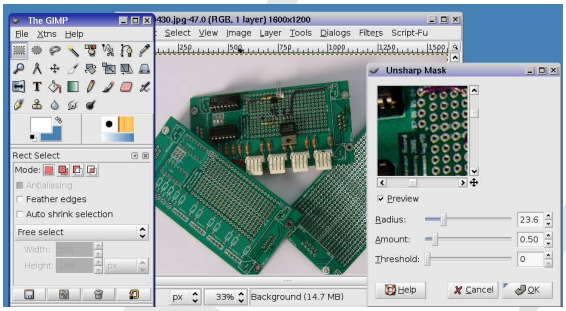
gwenview
http://gwenview.sourceforge.net/
[GPL]



Gwenview is a fast and easy to use image viewer that can load and save a wide range of image formats, including GIMP files (*.xcf). Gwenview lets the user accurately control the way images are scaled: you can

zoom in and out or automatically scale the image to fit the window, it is also possible to lock the zoom factor to keep the same zoom between images.

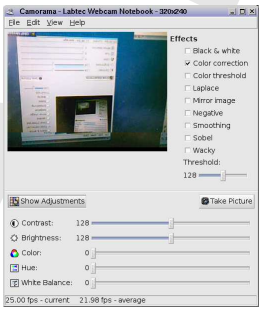
gimp
http://www.gimp.org/
[GPL]



GIMP is an acronym for GNU Image Manipulation Program. It can be used as a simple paint program, an expert quality photo retouching program, an online batch processing system, a mass production image renderer, an image format converter, etc.

GIMP is expandable and extensible. It is designed to be augmented with plug-ins and extensions to do just about anything. The advanced scripting interface allows everything from the simplest task to the most complex image manipulation procedures to be easily scripted.

Camorama
http://camorama.fixedgear.org/
[GPL]



Camorama is a image capture system designed to work with webcams. It offers a number of real-time image processing options together with stills capture. Multiple versions can be run concurrently allowing stereo and 3D images to be obtained.

vlc
http://www.videolan.org/vlc/
[GPL]

VLC media player is a highly portable multimedia player for various audio and video formats (MPEG-1, MPEG-2, MPEG-4, DivX, mp3, ogg, ...) as well as DVDs, VCDs, and various streaming protocols. It can also be used as a server to stream in unicast or multicast in IPv4 or IPv6 on a high-bandwidth network.

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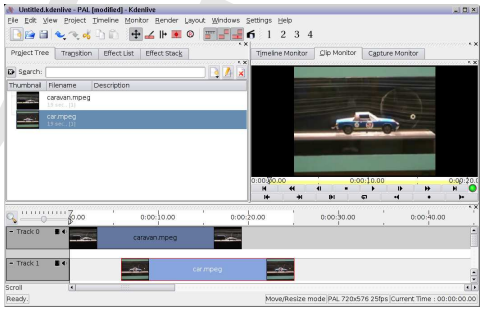
Winff
http://www.winff.org/
[GPL]
(**FFmpeg**
http://ffmpeg.mplayerhq.hu/
[GPL])

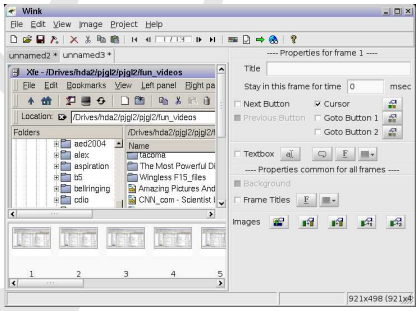
WinFF is a GUI for the command line video converter, FFMPEG. It will convert any video format file that FFmpeg will convert together with the facility to process multiple files in multiple formats in one operation.

kdenlive
http://www.kdenlive.org/
[GPL]



kdenlive is a non-linear video editor, that easily produce video clips etc suitable for presentations. It has the cpability to combine video tracks and sync audio tracks as required.

wink
http://www.debugmode.com/wink/
[Freeware]
(Author's Permission)]



Wink is a Tutorial and Presentation creation software, typically used to create flash videos of screen operations for software tutorials. It can be used add explanations boxes, buttons, titles etc to give the end user and interactive experience.

supershow
http://www.rastersoft.com/programas/supershow.html
[GPL]

SuperShow allows the used slides from a presentations, IMPRESS or Powerpoint, (exported to PDF) together with an audio/video recording of the presentation, and combine them in a single, small size, Adobe Flash file, which can be played from the net or downloaded to be seen locally.

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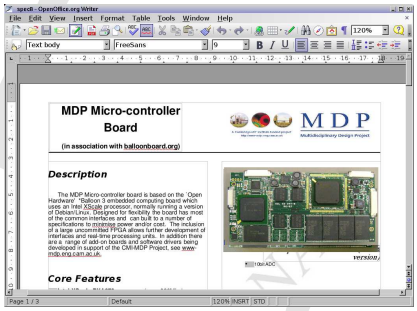
III.6 OpenOffice/DTP

EDal uses the OpenOffice suite (http://www.openoffice.org) suite as the basis for it standard office tools and a full DTP option is offered using Scribus. Support for technical writing is given via LaTeX and Kile see section III.6.2 and graphics support is also given a seperate section, see III.7 although a direct link to Inkscape is given in this menu.

III.6.1 OpenOffice

OpenOffice is being developed in the open domain with the support of Sun Microsystems and is now a mature product with excellent support on line from the website www.openoffice.org and the associated document and tutorial sites.

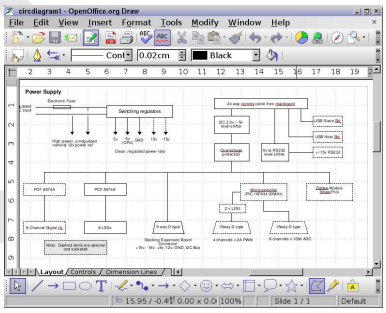
OpenOffice Writer
www.openoffice.org
[LGPL]



Writer is a fully functional word processor similar to many of the commercial competitors, including advanced features to aid the writing of reports etc. It is compatibility with most other commercial word-processors, reading and writing native files (inc. .doc and .docx), by default it uses the new international standard, XML based, OpenDocument format.

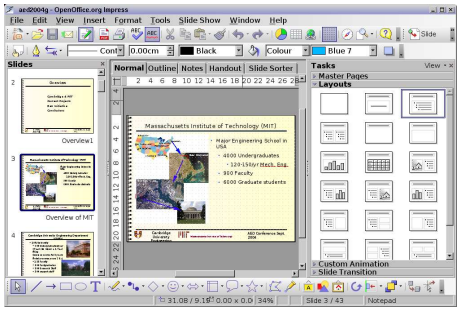
In addition, the system also allows the user to export documents HTML format for the web, or publish in Portable Document Format (.pdf).

OpenOffice Draw
www.openoffice.org
[LGPL]



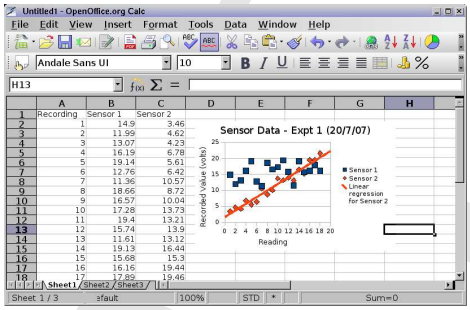
Draw is a substantial graphics application that integrates well with the whole Openoffice suite allowing drawings to be edited directly within text documents etc.

OpenOffice Impress
www.openoffice.org
[LGPL]



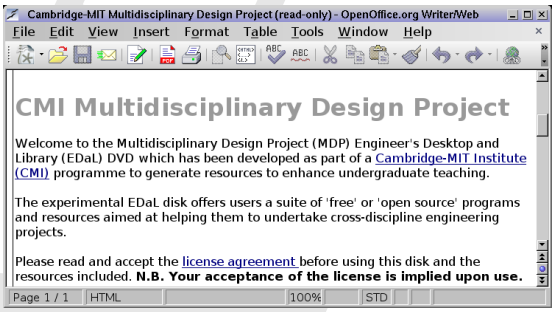
Impress is a powerful presentation package with features similar to Powerpoint. it can load and save .ppt files. It is good at maintaining formats and layouts between versions.

OpenOffice Calc
www.openoffice.org
[LGPL]


Untitled1 - OpenOffice.org Calc
File Edit View Insert Format Tools Data Window Help
Sensor Data - Expt 1 (20/7/07)
Reading
Recorded Value (volts)

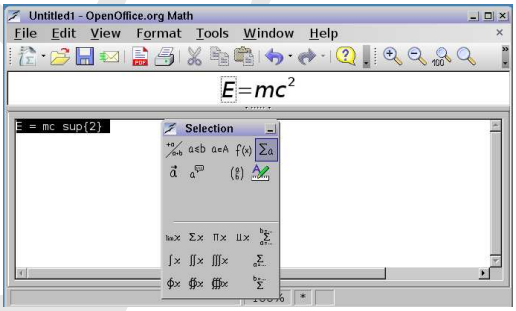
Calc is a fully functional spreadsheet package which can interchange files with other packages, e.g. gnumeric, Excel, retaining funtions and formats.

OpenOffice Web
www.openoffice.org
[LGPL]


Cambridge-MIT Multidisciplinary Design Project (read-only) - OpenOffice.org Writer/Web
File Edit View Insert Format Table Tools Window Help
CMI Multidisciplinary Design Project
Welcome to the Multidisciplinary Design Project (MDP) Engineer's Desktop and Library (EDaL) DVD which has been developed as part of a Cambridge-MIT Institute (CMI) programme to generate resources to enhance undergraduate teaching.
The experimental EDaL disk offers users a suite of 'free' or 'open source' programs and resources aimed at helping them to undertake cross-discipline engineering projects.
Please read and accept the license agreement before using this disk and the resources included. N.B. Your acceptance of the license is implied upon use.
Page 1 / 1
HTML
100%
STD

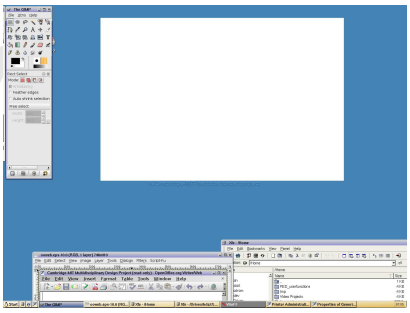
Web/HTML page editor

OpenOffice Math
www.openoffice.org
[LGPL]



Mathematical formulae editor for OpenOffice suite

OpenOffice Printer
www.openoffice.org
[LGPL]



Printer setup application for Openoffice, can also be accessed from within most OpenOffice applications.

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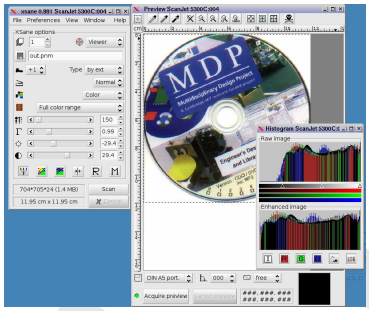
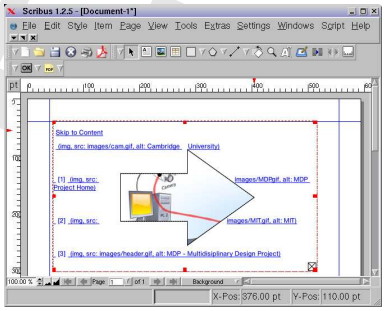
xsane
http://www.xsane.org/
[GPL]



XSane is a graphical frontend designed for acquiring images with scanners.. The system can scan direct to file, do a 'photocopy', create a fax, create and send a mail. Is also acts as a plugin to GIMP.

scribus
http://www.scribus.net/
[GPL]



scribus is a powerful DTP package, similar to Microsoft publisher or Pageplus, with the ability to import/export pdf, eps, svg.

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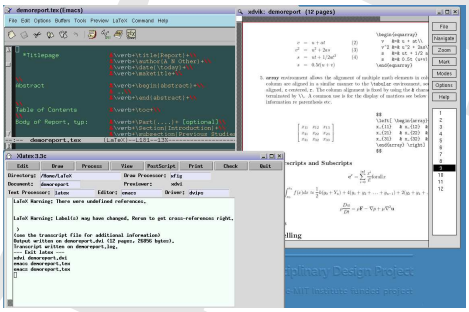
III.6.2 LaTeX

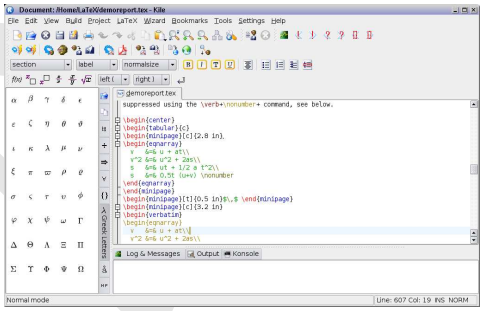
LaTeXis a document markup language and document preparation system widely used by mathematicians, scientists, philosophers, engineers, scholars in academia and the commercial world, and other professionals. LaTeX is used because of the quality of typesetting achievable by TeX. The typesetting system offers programmable desktop publishing features and extensive facilities for automating most aspects of typesetting and desktop publishing, including numbering and cross-referencing, tables and figures, page layout and bibliographies.

Xlatex
http://www.tug.org
[LPPL]



Xlatex offers a simple interface to editing, processing and viewing/printing LaTeXdocuments. Used with emacs (see Editors section) it offers a quick solution to producing high quality documents. Emacs has been enhanced to give real-time highlighting and local previews as required

Kile
http://kile.sourceforge.net
[GPL]



Kile is a fully featured development environment for the production of LaTeX documents, with a simple to use user interface that gives a 'click and place' functionality to LaTeXformats.

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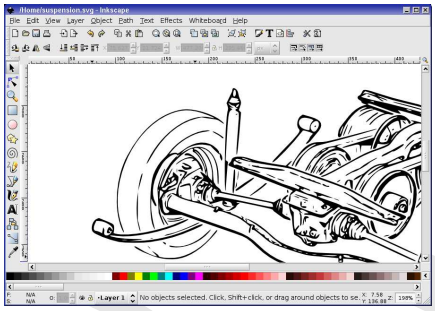
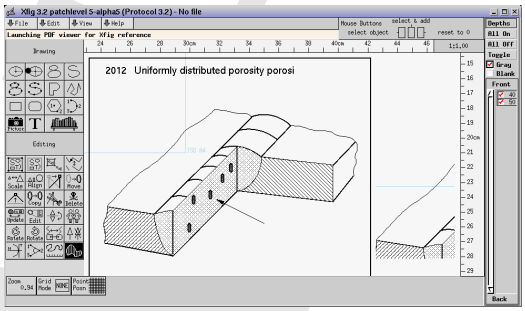
III.7 Drawing/CAD

inkscape
http://www.inkscape.org/
[GPL]



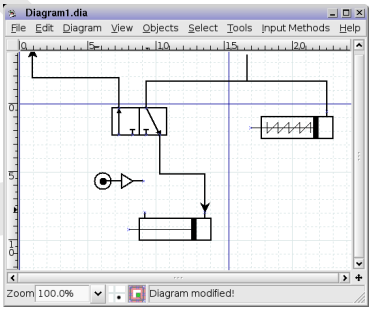
Inkscape is vector graphics editor, that uses Scalable Vector Graphics (SVG) file format as it's base format and allows the use of many of the standard SVG features, e.g. markers, clones, alpha blending, etc. It has a wide range of export formats and is similar in operation to Illustrator, CorelDraw, or Xara X.

xfig
http://www.xfig.org/userman/
frm_introduction.html
[GPL]



Xfig has a slightly old style of user interface but once mastered gives a very powerful 2D drawing package with low end CAD functionality. It has a range of predefined drawings including circuit and structural force diagrams.

dia
http://www.inkscape.org/
[GPL]



Dia is similar in operation to the commercial program 'Visio', but with less functionality It is particularly good at constructing relationship diagrams, UML diagrams, flowcharts, network diagrams. It has a substantial library and can export diagrams to a number of formats, including EPS, SVG, XFIG, WMF and PNG.

Qcad
http://www.ribbonsoft.com/qcad.html
[GPL]

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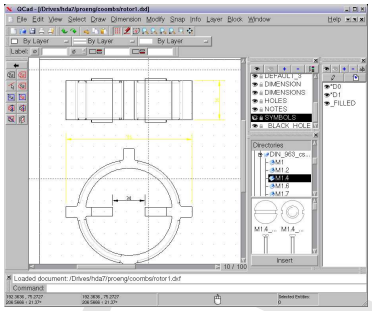
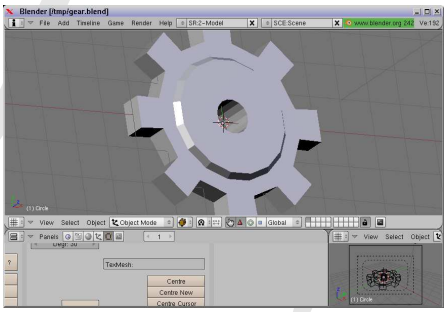


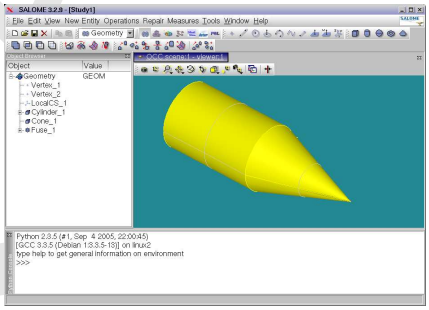
Qcad is a fast and easy to use 2-D Cad package with libraries for mechanical, architectural and electronic parts /components. Its default file format is dxf (Drawing eXchange Format) which enables it to read and write to most of the commercial CAD packages.

blender
http://www.blender.org/
[GPL]



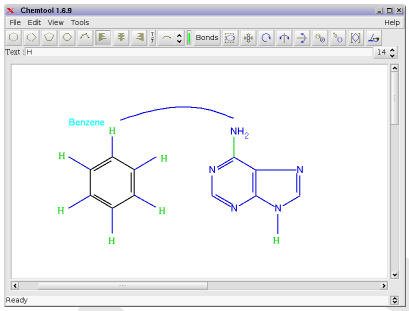
Blender is a free 3D modelling/animation application that uses Virtual Reality Modelling Language (VRML) as its core file format. It has a wide range of input and output formats allowing it to interchange models with other CAD packages and output models to the web and rapid prototyping applications.

Salome
http://www.salome-platform.org/
[GPL]



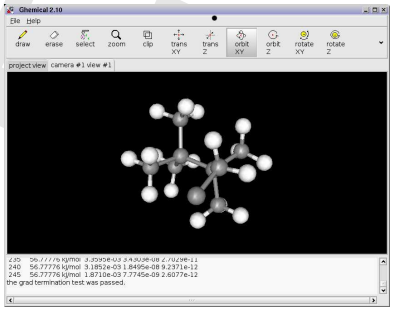
The geometry tool of the Salome-Meca analysis suite gives a basic 3D CAD tool that can be used to create/modify, import/export (IGES, STEP), repair/clean CAD models. It links to a number of meshing and simulation packages, see Aster in section III.11 below.

chemtool
http://ruby.chemie.uni-freiburg.de/martin/chemtool/
[GPL]



Chemtool is a 2D chemical structure editing package. Drawing produced can be exported in a range of formats including, EPS, SVG, Xfig. It also supports direct input from ghemical.

ghemical
http://www.bioinformatics.org/ghemical/ghemical/
[GPL]


Ghemical 2.10
File Help
draw erase select zoom clip trans XY trans Z orbit XY orbit Z rotate XY rotate Z
project:view camera #1 view #1
the grad termination test was passed.

Ghemical is a molecular modelling software package. It has a number of very powerful features that mean making correctly orientate image of atomic structures is easy. It also has a wide range of output format options to interact with many other chemical programs.

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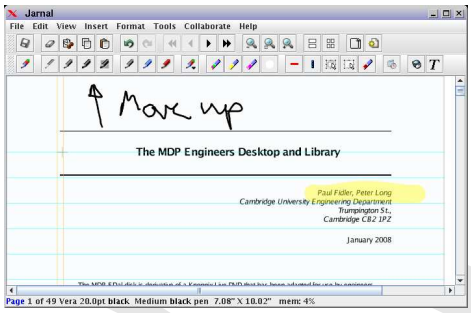
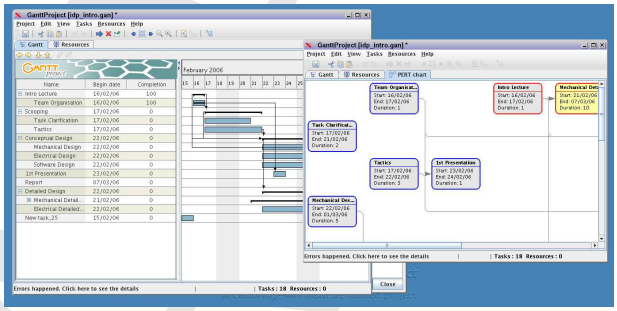
III.8 Project Support

jarnal
http://www.dklevine.com/general/software/tc1000/jarnal.html
[GPL]



Jarnal is a cross-platform general purpose application for note taking, sketching, keeping a journal, making a presentation, annotating a document - including PDF - or collaborating across the intra/internet using a stylus, mouse or keyboard. It has similarities to Microsoft Windows Journal and One-Note but has much better facilities for embedding documents and revisiting previous decision points,

ganttproject
http://sourceforge.net/projects/ganttproject/
[GPL]



Ganttproject is a simple project management tool similar to MS Project (There is a import/export function for MSP files)

freemind
http://freemind.sourceforge.net/
[GPL]

Freemind is a easy to use cross-platform application to generate and maintain mindmaps. It has good drag-and-drop facilities to aid the re-layout of maps, the ability to include HTML links and export to HTML ad other packages via XML.

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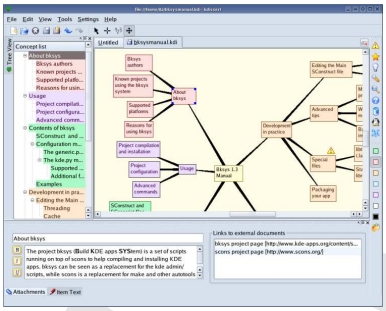
kdissert

http://freehackers.org/ tnagy/kdissert.html
[GPL]



Kdissert is a mindmap style program specifically designed to help with the production of project documentation. Once the map has be constructed and populated with attachments, e.g. additional text, images etc, the structure can be exported in a number of text formats, e.g. OpenOffice, HTML, Latex , PDF presentation.

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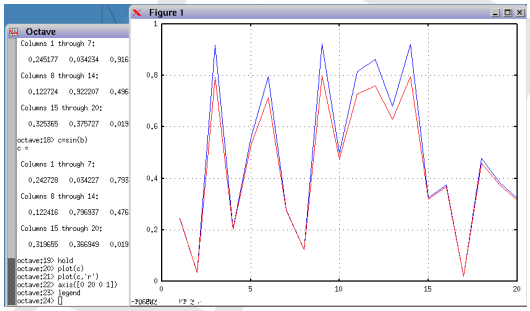
III.9 Octave

The GNU Octave language for numerical computations Octave is a (mostly Matlab compatible) high-level language, primarily intended for numerical computations. It provides a convenient command-line interface for solving linear and nonlinear problems numerically.

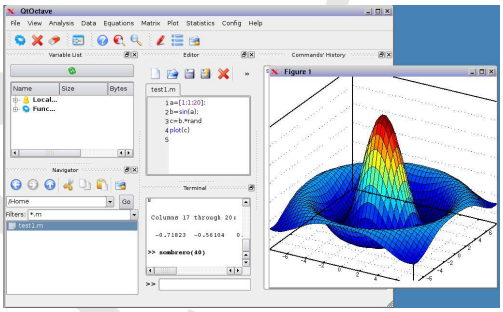
The associated octave-forge project contains contributed functions for GNU Octave which are not in the main distribution, but is included in the EDaL system.

octave
http://www.gnu.org/
[GPL]



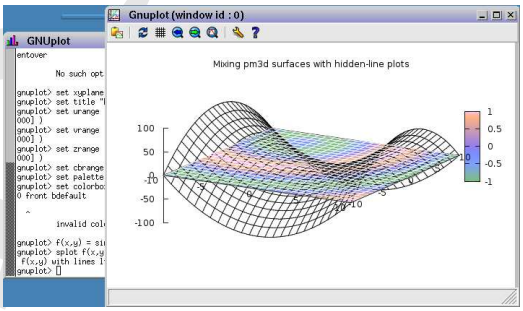
Octave is by default a command-line driven application and this option starts the octave in a terminal window. Subsequent plotting etc will appear in auxiliary windows.

qtoctave
http://qtoctave.wordpress.com/what-is-qtoctave/
[GPL]



Qtoctave is a graphical interface to octave, similar to this supplied with recent versions of MATLAB and Scilab. It gives a complete working environment in series of dockable/re-arrangeable panes.

gnuplot
http://www.gnuplot.info/
[GPL]



gnuplot is a scripting program for the generation of two- and three-dimensional plot. It can be used as a standalone application or as a helper application for other programs, e.g. Octave and wxMaxima on the EDaL system.

gnuplot can produce output directly on screen, or in many formats of graphics files, including PNG, EPS, SVG, JPEG and many others. It is also capable of producing LaTeX code that can be included directly in LaTeX documents.

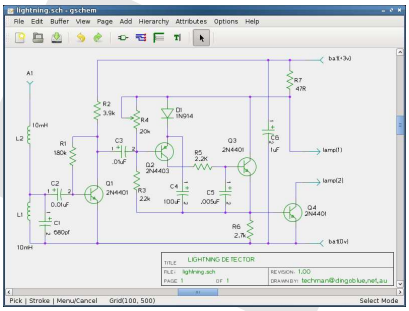
III.10 Electronic CAD and Analysis

The disk contains a range of ECAD related packages including schematic capture, pcb layout, simulation and analysis. The gEDA (gnu Electronic Design Automation) suite offers most

III.10.1 gEDA

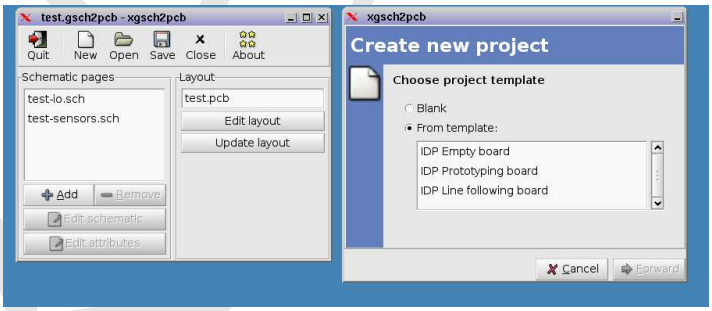
gEDA is a suite of electronic design automation (EDA) tools. Currently, the project offers a mature suite of free software applications for electronics design, including schematic capture, attribute management, bill of materials (BOM) generation, netlisting into over 20 netlist formats, analog and digital simulation, and printed circuit board (PCB) layout.

gscheme
http://geda.seul.org/
[GPL]



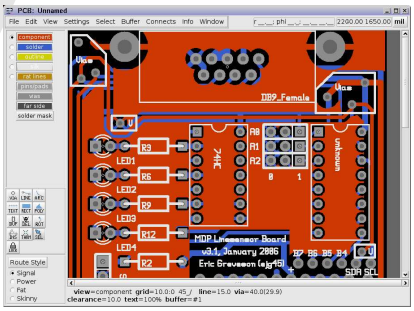
gschem is the schematic capture program/tool part of gEDA. It can be used on its own to produce high quality schematics or as the primary input to other packages within the gEDA suite, notably gschem2pcb (schematic input to pcb design), gspiceUI (schmatic input to spice simulation), gattrib (formatted bill of materials)

xgsch2pcb
http://geda.seul.org/
[GPL]



xgsch2pcb is a graphical project management tool for the gEDA suite, in particular to aid the link between the graphical schematic capture and printed circuit design packages.

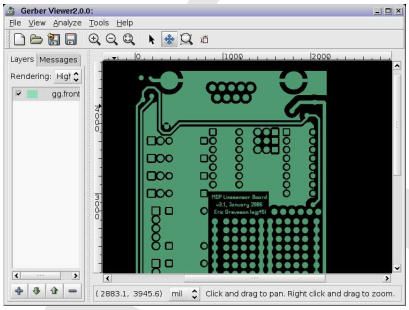
pcb
hhttp://pcb.sourceforge.net/
[GPL]



PCB is an interactive printed circuit board editor which includes a ratsnest feature, design rule checking, and can provide industry standard RS-274-X (Gerber), NC drill, and centroid data (X-Y data) output for

use in the board fabrication and assembly process. PCB also offers high end features such as an autorouter and trace optimizer which can tremendously reduce layout time.

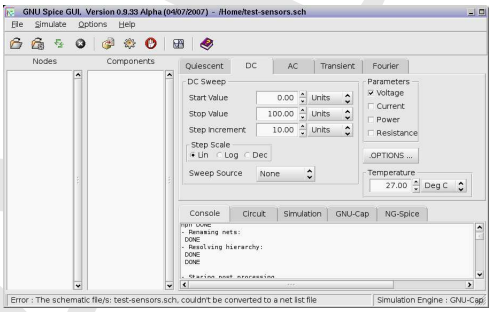
gerbv
http://gerbv.sourceforge.net/
[GPL]



Gerber Viewer (gerbv) is a viewer for Gerber files which are normally generated from PCB CAD systems (e.g. pcb) and sent to PCB manufacturers as basis for the manufacturing process.

The different layers of the PCB are separated into different files. gerbv can load all files at the same time and allows the user to browse through the different layers with the radio buttons on the left side.

gspiceUI
http://gerbv.sourceforge.net/
[GPL]



GNU Spice GUI provides a GUI for two freely available electronic circuit simulation engines: GNU-Cap and Ng-Spice, included in the gEDA suite

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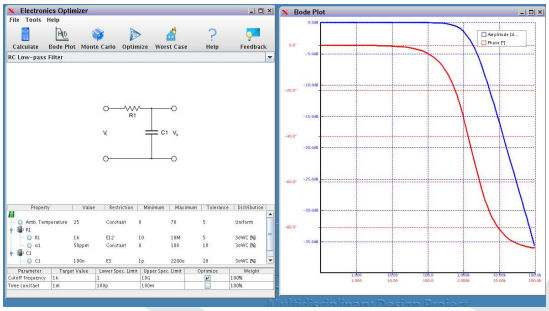
III.10.2 Electronics - Simulation and Analysis

Electronics Optimiser

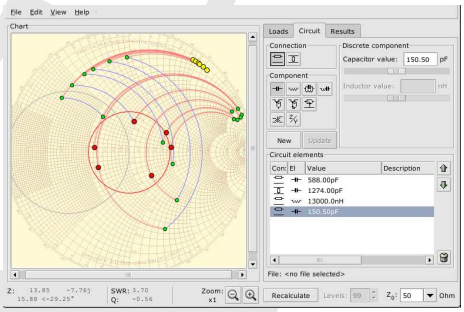
http://www.damhave.com/
[Freeware]



Electronics Optimizer is a electronics design tool that lets you design and optimize some of the most commonly used electronics circuits. The internal workings of the Electronics Optimizer program is based on formulas for a library of standard circuits. As such it can be faster than using Spice based tools when designing common circuits

LinSmith

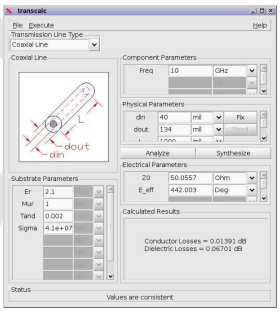
http://www.jcoppens.com/
[GPL]



LinSmith is a Smith charting program, in which either discrete components or transmission lines can be entered and the results displayed on screen, and/or generate Postscript output. Component values can be changed numerically or using scrollbars.

Transcalc

http://transcalc.sourceforge.net/
[GPL]



Transcalc is an analysis and synthesis tool for calculating the electrical and physical properties of different kinds of RF and microwave transmission lines. The user interface allows material and operational properties to be adjusted and the component/line analyzed. If the required electrical properties are entered the physical parameters can be sythesized.

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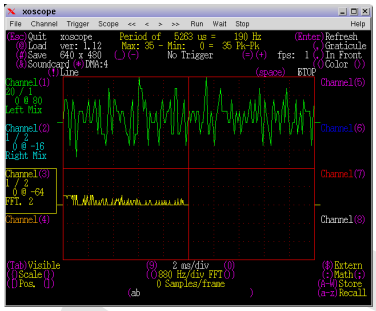
Xoscope

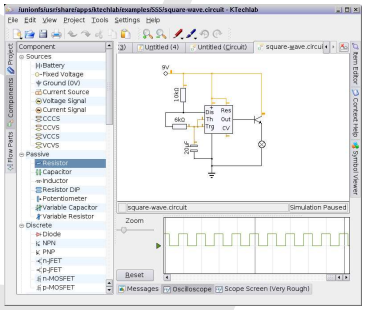
http://xoscope.sourceforge.net/
[GPL]



Xoscope is a simple yet powerful digital oscilloscope that uses as its input the standard computer sound card or EsounD and/or a ProbeScope/osziFOX and/or Bitscope hardware. Allows for upto 8 signals to be displayed with variable time scale, math (e.g. fft), memory, measurements, and file save/load.

Ktechlab

http://ktechlab.org/
[GPL]

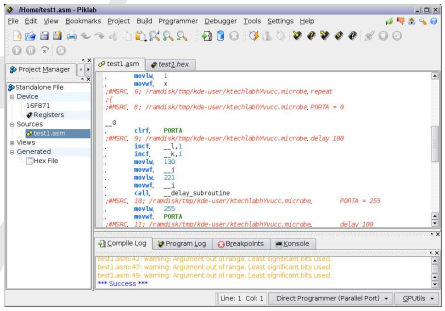


KTechLab is an Open Source Intergated Design Environment (IDE) for electronic and PIC micro-controller circuit design and simulation.

It has an extensive circuit designer with autorouting and simulation of many common electronic components and logic elements. It also has an easy to use, flowchart based PIC program designer - Flowcoder; along with a BASIC like programming language called Microbe. Programs designed by these tools can be added to any circuit design as a 'virtual' PIC allowing complex micro-controller based circuits to be created.

Piklab

http://piklab.sourceforge.net
[GPL]



Piklab is an integrated development environment (IDE) for applications based on Microchip PIC and dsPIC micro-controllers similar to the MPLAB environment. It integrates with several compiler and assembler toolchains (like gputils, sdcc, c18) and with the GPSim simulator. It supports the most common programmers (serial, parallel, ICD2, Pickit2, PicStart+), the ICD2 debugger, and several bootloaders (Tiny, Pickit2, and Picdem).

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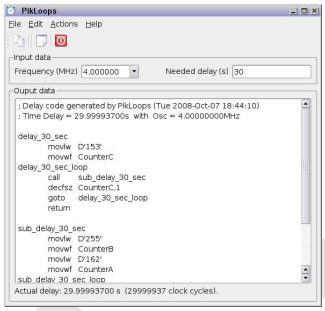
Pikloops

http://piklab.sourceforge.net
[GPL]



PiKLoop generates code to create delays for Microchip PIC microcontrollers. It is a useful companion for the Piklab IDE.

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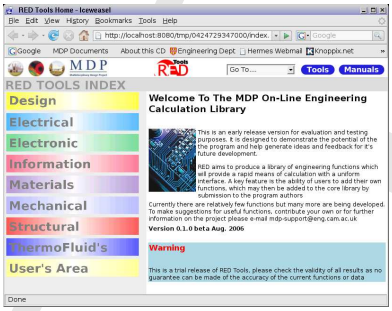
III.11 Simulations

A range of simulation and analysis applications primarily based on civil/structural engineering however the RedTools package has a number of spreadsheets and British Standards related calculations encoded.

RedTools

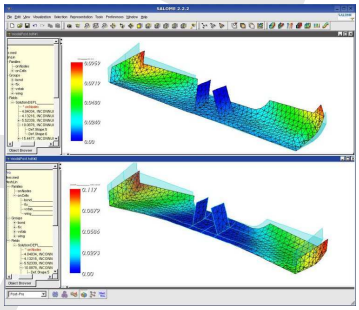
http://www-mdp.eng.cam.ac.uk/Redtools
[GPL]



RedTools is a user editable library of engineering/scientific simulations and calculations. The package allows for both spreadsheet and octave/MATLAB syntax functions to be held in the database. The Octave scripts can also be run automatically from a Web interface generated by a simple textfile. The system also allows for the addition of on-line manual entries/tutorials to be added.

Code-Aster

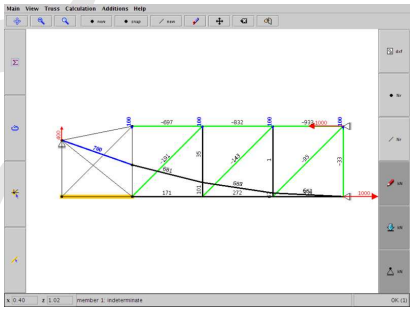
http://www.code-aster.org
[GPL]



Code-Aster (or Aster) is a finite element analysis and numeric simulation for mechanical systems. It has a range of modules including linear and non-linear statics and dynamics and 3D thermal. It was released opensource by the French company EDF, but is still used for the design of conventional and nuclear power plants.

fackwerk

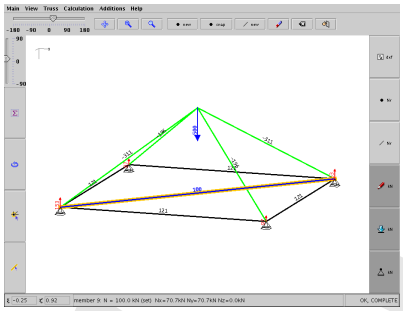
http://fachwerk.berlios.de
[GPL]



Fachwerk gives a simple interface to the analysis discontinuous stress fields and strut-and-tie models. It only uses the equilibrium conditions and does not include elastic behaviour of the members.

If the system is statically indeterminate, the program calculates the forces of the members that are determinate anyway. You can assign forces to the remaining members. If you assign more forces to members than needed to accomplish a statically determinate system, the program will indicate that the system is inconsistent.

fackwerk3d
http://fachwerk.berlios.de
[GPL]



Similar in operation to Fachwerk, see above, the program allows the analysis and visualisation of 3-dimensional strut-and-tie models.

Flightgear
http://www.flightgear.org/
[GPL]

Flight Gear is a flight simulator that can be used for simply understanding flight controls or , as the underlying simulation code is opensource, for direct simulation of flight parameters. See the manuals for more details.

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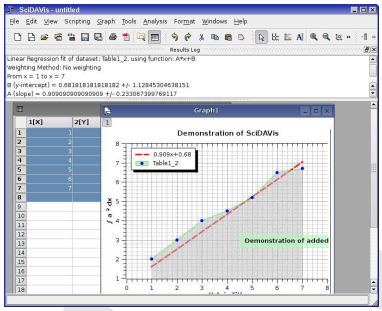
III.12 Scientific Tools

SciDavis

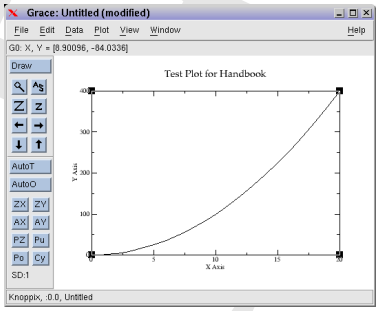
http://scidavis.sourceforge.net/
[GPL]



SciDavis is a interactive application aimed at data analysis and publication-quality plotting. It combines a shallow learning curve and an intuitive, easy-to-use graphical user interface with powerful features such as scriptability and extensibility.

xmgrace

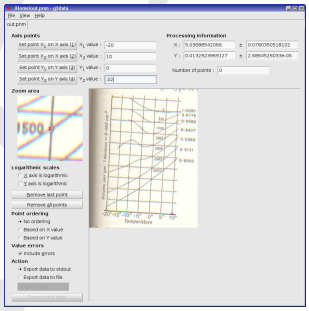
http://plasma-gate.weizmann.ac.il/Grace/
[GPL]



xmgrace is included in the system as it combines well with Octave and can be used to produce publication quality B&W graphs.

g3data

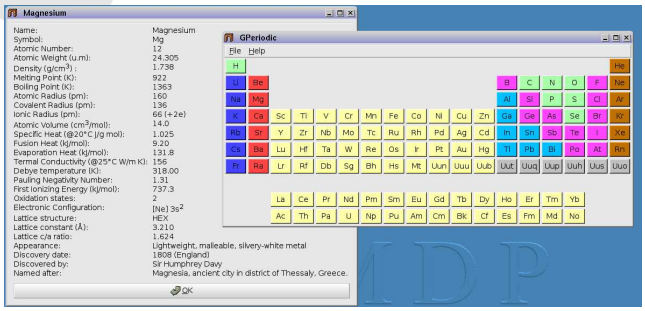
http://www.frantz.fi/software/g3data.php
[GPL]



g3data is a tool for extracting data from scanned graphs, e.g. from published in scientific articles where the actual data has not been explicitly given. g3data simplifies the task of extracting the data with predefined support for problems like rotated figures and logarithmic axis.

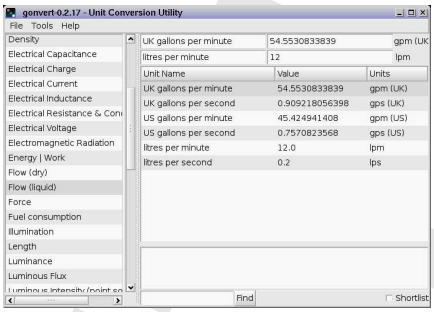
gperiodic

http://www.frantz.fi/software/gperiodic.php
[GPL]



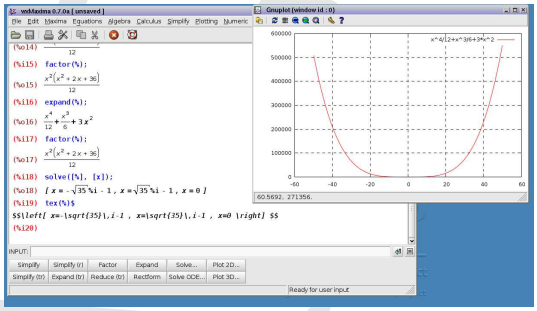
GPeriodic is a graphical interface to a database of 30+ items for each element. The database is also accessible from the command line giving

access to data items and also the ability to display element phases at a user selected temperature.



gonvert
http://unihedron.com/projects/gonvert/
[GPL]

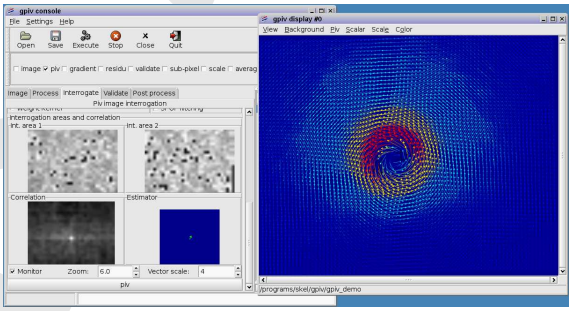
gonvert is a conversion utility that allows conversion between many units schemes, e.g. SI, CGS, Imperial with over 50 categories like length, mass, numbers, etc. All units converted values shown as you type.



wxmaxima
http://wxmaxima.sourceforge.net/
[GPL]

wxmaxima is a GUI for Maxima (http://maxima.sourceforge.net/) which is a system for the manipulation of symbolic and numerical expressions, including differentiation, integration, Taylor series, Laplace transforms, ordinary differential equations, systems of linear equations, polynomials, and sets, lists, vectors, matrices, and tensors.

wxMaxima can also plot results in2d and 3D and export expressions in LaTeXand HTML format.



gpiv
http://gpiv.sourceforge.net/
[GPL]

gpiv is a graphical front end to the gpiv-tools which have been written to obtain, analyse and present the data from PIV experiments. Primarily developed for the measurement of fluid flows, PIV can also be used to measure any small displacements in 2D provided there are enough markers avaialble in the image.

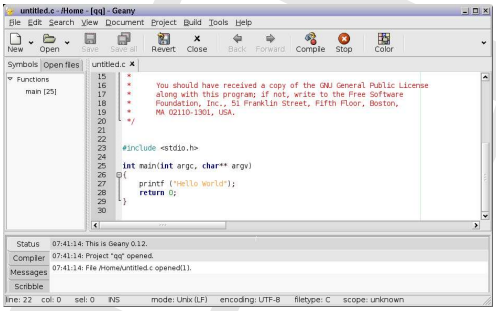
III.13 Programming

III.13.1 Development Environments

Emacs
http://www.gnu.org/software/emacs/
[GPL]

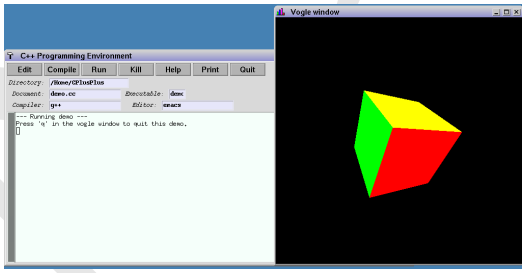
Emacs has been included as a all encompassing editor/IDE, with editing modes for most languages, see section III.1 for more details.

Geany
http://geany.uvena.de/
[GPL]



Geany is a small and fast integrated development environment, with a wide range of features including: syntax highlighting, code folding, code completion, support for >20 languages including C, Java, PHP, HTML, Python, Perl, Pascal.

Xcc
http://www.eng.cam.ac.uk
[GPL]



xcc is a simple development environment for use with C and C++ code.

III.13.2 Languages

C
http://gcc.gnu.org/
[GPL]

C is a general-purpose language originally designed for generating system software. It is now used for a many control applications, it is supplied on the EDaL system by the GNU Compiler Collection (gcc) the official compiler for the opensource GNU system.

C++
http://www.gcc.gnu.org/
[GPL]

The C++ programming language evolved from C and is emerging as the standard in software development. Many operating operating systems and applications are now written in C++. The EDaL system uses the c++ compiler contained within the gcc suite.

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Fortran 77/95
http://www.gcc.gnu.org/
[GPL]

Fortran is one of the earliest procedural languages to be developed and while having been superseded in a wide range of area is still used in computational modelling often building on existing libraries. It is supplied on the EDaL system by gcc, currently offering f77 and f95 functionality, but expected to include aspects of Fortran 2003.

java
http://www.java.com/
[GPL]

Similar in syntax to C/C++ Java has the benefit that it is typically compiled to an intermediate 'bytecode' which means that a single programme can be run on a number of coputer architectures using a Java Virtual Machine (JVM). The version included on the system was originally developed by SUN microsystems and released under the GPL in 2007.

Perl
http://www.perl.org/
[GPL]

Perl is a general-purpose programming language originally developed for text manipulation and now used for a wide range of tasks including system administration, web development, network programming, GUI development,

Python
http://www.python.org/
[GPL]

Python is a dynamic object-oriented programming language that is used for many kinds of software development. It has good integration with other languages and tools, although the core is relatively small has a wide range of standard libraries.

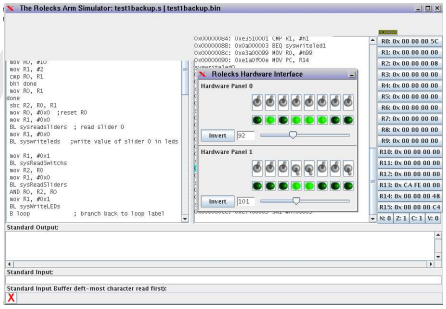
Brandy
http://sourceforge.net/
projects/brandy/
[GPL]

Brandy is a cross platform recoding of the BASIC that was used in the BBC micro and subsequently extended in the Acorn range of computers. It has been included as there a large number of people with knowledge of the language and it speed of learning/operation make a very functional language for scripts. Also a number of the underlying formatting and web scripting programs used in the MDP project were based on old BBC Basic scripts.

Bash
http://www.gnu.org/
software/bash/
[GPL]

Bash is the GNU Project's Bourne Again SHell, which is a super-set of the Bourne Shell *sh*. As such bash can process most shell scripts without modification while giving offering a number of powerful extensions. Run in a standard xterm it offers simple emacs editing commands, command history and completion.

**ARM Assembler/
MAS_Rolecks**
http://www-
mdp.eng.cam.ac.uk//
[GPL]



Based on Rolecks, developed at the University of Massachusetts, the program gives a simple ide that can be used to develop ARM assembler. Access is given to simulated analogue inputs and digital inputs/outputs to enable simple control programs to be developed.

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IV. Documentation and Tutorials

A large number of the programs included in the EDaL system have embedded help files, however some have been found to be limited or do not work well with the EDaL system. In addition, feedback has been shown that most users prefer to have option to read documentation and tutorials in paper format. Therefore wherever possible PDF copies of the standard and extended application help documents have been included on the system allowing them to be accessed quickly from the EDaL tab on the local MDP documents web page. (see item 4 on the start menu). Following the links to *Desktop Apps* and *Engineering Apps* gives access to the database.

The listings below give an indication of the documentation and tutorials that are available. N.B. Some documents are large ¿800 pages so while browsing is fast as the documents are held locally the user may wish to limit the range of pages printed should hard copy be required.

IV.1 Desktop Applications

Wordprocessing/Spreadsheet/Presentation - OpenOffice

	Microsoft Office → Open Office Migration Guide [pdf]
Writer	*Getting Started with Writer [pdf]*
Calc	*Getting Started with Calc [pdf]* *Predefined Engineering Spreadsheets*
Impress	*Getting Started with Impress [pdf]*
Draw	*Getting Started with Draw [pdf]*

Web Browser, Mail tool - Mozilla

Iceweasel	Online help only - See Help (F1)
Icedove	Online help only - See Help (F1)

Text Editor - Emacs

Emacs	*Beginner's Guide [pdf]* *Reference Card [pdf]*

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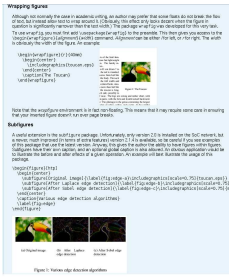
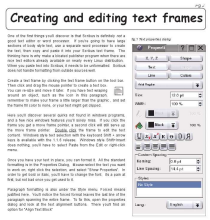
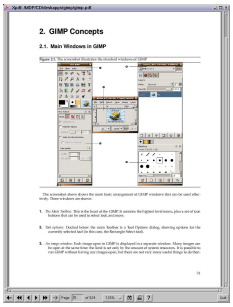
IV.1.1 Document Preparation - LaTeX/TeX / DTP





Latex	*Getting to Grips with Latex [html]* *LaTeX command reference [html]* *LaTeX for Word processor Users [pdf]* *The Not so short Introduction to LaTeX [pdf]*
Kile	*Kile Handbook [html]*
Xlatex	*User Manual [pdf]*
Xdvi	*User Manual [pdf]*
Scribus	*Simple User Manual [pdf]* *Tutorial [pdf]*
Inkscape	*Manual [pdf]* *keyboard shortcuts [pdf]*

Multimedia Graphics/Images

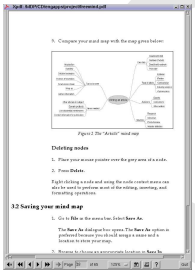


Imagemagick	*User Manual [html]*
Gimp	*User Manual [pdf]*
Audacity	*Quick Start [pdf]* *User manual [pdf]*
Winff	*User manual [pdf]*
kdenlive	*Quickstart [html]*
Wink	*Tutorial [pdf]*
Supershow	*Tutorial [html]*
Xsane	*User manual [pdf]*

File Viewers

Xpdf	*User manual [pdf]*
Xdvi	*User Manual [pdf]*

Project Management



Ganttproject	*Manual [pdf]*
Jarnal	*Manual [pdf]*
Freemind	*Manual [pdf]*
Kdissert	*Quickstart/Manual [pdf]*

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IV.2 Engineering Applications

Analysis/Mathematical Tools

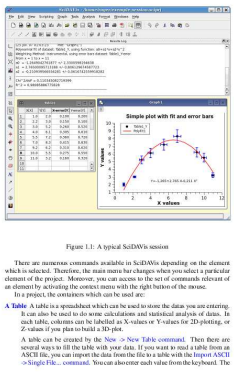


Figure 1.1: A typical SciDAVis session

There are numerous commands available in SciDAVis depending on the element which is selected. Therefore, the main menu bar changes when you select a particular element of the project. Moreover, you can access to the set of commands relevant of an element by activating the context menu with the right button of the mouse.
In a project, the containers which can be used are:

A Table. A table is a spreadsheet which can be used to store the datas you are entering. It can also be used to do some calculations and statistical analysis of datas. In each table, columns can be labelled as X-values or Y-values for 2D-plotting, or Z-values if you plan to build a 3D-plot.
A table can be created by the New -> New Table command. Then there are several ways to fill the table with your data. If you want to read a table from an ASCII file, you can import the data from the file to a table with the Import ASCII -> Single File... command. You can also enter each value from the keyboard. The

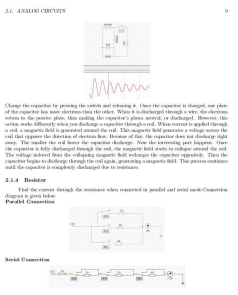
4

Octave	*Introduction to Octave/MATLAB [pdf]* *Octave manual [pdf]* *Reference Card [pdf]* *Octave FAQ [online]* *List of functions [online]*
Scidavis	*Users' Guide [pdf]*
Grace	*Users' Guide [pdf]* *Tutorial [pdf]*
Gnuplot	*Manual [pdf]* *Quick Reference Card [pdf]* *LaTeX-Gnuplot Tutorial [pdf]*
wxMaxima	*Introduction [pdf]* *Manual [pdf]*

Simulation

Aster	*See Application Help (F1)*
FlightGear	*Overview* *Tutorial [html]* *Manual [pdf]* *Hotkeys [pdf]* *Flight school [pdf]* *Aerodynamic model manual [pdf]*
REDTools	*Function Guide [pdf]* *Reference Card [pdf]*

Electronic/Electrical Design



2.1. ANALOG CIRCUITS 9

Charge the capacitor by pressing the switch and releasing it. Once the capacitor is charged, one plate of the capacitor has more electrons than the other. When it is discharged through a wire, the electrons return to the positive plate, thus making the capacitor's plates neutral, or discharged. However, this action works differently when you discharge a capacitor through a coil. When current is applied through a coil, it creates a magnetic field around the coil. The field is created by electrons moving around the coil that opposes the direction of electron flow. Because of this, the capacitor does not discharge right away. The smaller the coil and faster the capacitor discharge. Now the interesting part happens. Once the capacitor is fully discharged through the coil, the magnetic field starts to collapse around the coil. The voltage induced from the collapsing magnetic field recharges the capacitor oppositely. Then the capacitor begins to discharge through the coil again, generating a magnetic field. This process continues until the capacitor is completely discharged due to resistance.

2.1.4 Resistor

Find the current through the resistance when connected in parallel and serial mode.Connection diagram is given below.

Parallel Connection

Serial Connection

gEDA suite	*gEDA documentation index [html/pdf]* *Starting with gEDA [pdf]* *PCB : Tutorial [pdf]* *PCB : Manual [pdf]* *PCB : Reference Card [pdf]*
Electronics Optimizer	*See Application Help (F1)*
Xoscope	*Manual [pdf]*
Ktechlab	*Manual [pdf]*
Piklab	*Manual* *Supported Devices*

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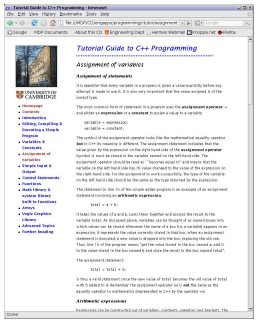
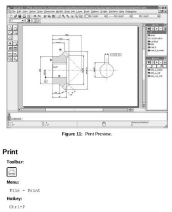
Programming



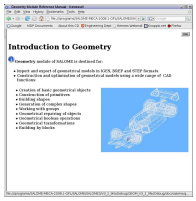
gcc	*C++ Tutorial [html]*
g77	*Guide To Fortran 77 [pdf]*
	manual [pdf]
gfortran	*Overview of Fortran 95 [pdf]*
	manual [pdf]
Java	*Java Introduction [pdf]*
perl	*mannual [html]*
	Tutorial [html]
	CGI Perl [pdf]
python	*Tutorial [html]*
	Tutorial [pdf]
	Ref. manual [pdf]
	Libray manual [pdf]
bash	*beginners Guide [pdf]*
Brandy	*User Manual*

2D Drawing/CAD



Inkscape	*Manual [pdf]*
	keyboard shortcuts
Dia	*Manual [pdf]*
QCad	*Manual [pdf]*
Chemtool	*Quickstart guide [pdf]*

3D Drawing/CAD



Blender	*Quickstart manual [pdf]*
	Intro manual [pdf]
	Advanced manual - Resources [pdf]
Salome	*Geometry Manual [html]*
ghemical	*Quickstart guide [pdf]*
Pro/E Wildfire 3	*Mini-manual (Wildfire 3) [pdf]*
	Quick Reference Guide [pdf]
	Tutorial (3 part) [pdf]

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V. Library

This library section of EDaL contains a number of pdf and locally hosted (on disc/usb) versions of websites covering various areas of engineering. The lists below give a brief description of some of the individual documents including details of the major topics covered. The resources come from a variety of sources and in a number of cases the distribution licence/agreement (indicated after the title) is specific to the EDaL system and no permission has been granted for general re-distribution, in particular:-

[author]	No specific licence, permission given by author to re-distribute as part of the EDaL system
[creative commons]	Creative Commons licence, see section VIII.10
[GPL]	Documents distributed under the GPL documentation licence, see section VIII.10
[MDP]	material developed as part of the MDP project, where appropriate the copyright remains with Cambridge University of MIT, but released for general distribution.
[permission]	No specific licence, permission given by copyright owner, e.g. company, government organisation to re-distribute as part of the EDaL system

V.1 MDP Documents

Documents developed during and after the MDP project, including:-

Databook
[MDP/permission]

A collection of useful design and resource data extracted from databooks, company information and datasheets, catalogues and articles, e.g. bolt strengths, 'o'-rings, electrical components.

Engineering dictionary
[MDP/permission]

Collection of engineering specific words & definitions collated from website, company information etc and collated as a dictionary.

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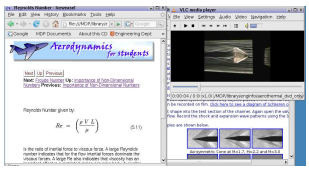
V.2 Aerothermal

Contains Aerodynamic, thermodynamic, and fluid mechanics resources and databooks, including :-

Aerodynamics for Students
[Author]

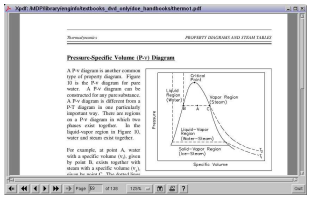


Interactive web pages covering most aspects of aerodynamics, starting from simple concepts, e.g. what is Lift?, What is Drag? through to tutorials on aerofoil sections and wind tunnels. Also included are a number of flow visualisation videos and downloadable software packages/routines.

How wings work?
[Author/IOP]

A monograph on the flows around wings and how lift is generated.

Fundamentals Handbook -Thermodynamics, Heat Transfer and Fluid Flow
[Public Release/Permission]



Three volumes (total $\sim$ 300 pages) covering the basics of the areas

1. **Thermodynamics** - Properties, Energy/work/heat, thermodynamic systems, property diagrams and compression processes.
2. **Heat Transfer** - Terminology, Conduction, convection, Heat exchangers, heat generation, decay heat.
3. **Fluid Flow** - Continuity, Laminar/Turbulent flow, Bernoulli, two phase flow, pumps.

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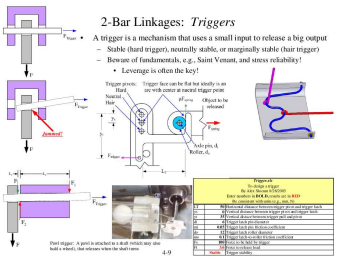
V.3 Materials and Mechanical

Material and Mechanical Engineering resources and databooks.

FUNdaMENTALS of Design

[author]

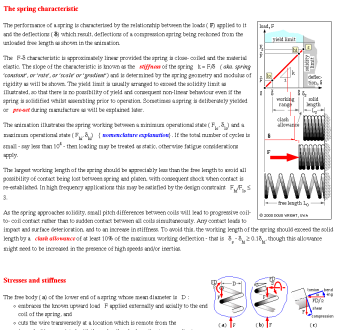

2-Bar Linkages: *Triggers*
A trigger is a mechanism that uses a small input to release a big output
Stable (hard trigger), neutrally stable, or marginally stable (hair trigger)
Beware of fundamentals, e.g., Saint Venant, and stress reliability!
Leverage is often the key!

Written by Prof. A. Slocum to complement the MIT 2.007 course, see section V.5, for details in more chapters from the book.

- **4 Linkages** - background, joints, degrees-of-freedom, 2/4/6/.. bar linkages, compliant mechanisms
- **5 & 6 Power Transmission** - Pulleys/capstans, belts/cables, lead-screws, gears (spur/epicyclic/differential), cams and shafts.
- **7 Power Systems** - pneumatics, springs, dc/geared motors and power budgets.
- **10 Bearings** - Linear/rotary bearing systems (sliding and rolling element), non-contact and flexural bearings, mounting geometry and pre-loading.

Design and Analysis of Machine elements

[author]

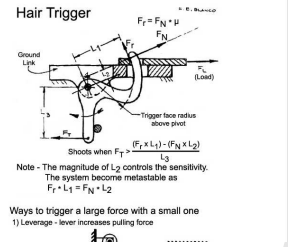


Extensive HTML resource which covers the introduction and details on a range of mechanical components (see also the design section V.5 for further details). Topics covered include

- **Springs** - Introduction, spring characteristics, materials and design calculations
- **Threaded Fasteners** - types, terminology, thread mechanics, assembly and usage calculations.
- **Welded Joints** - Introduction, forces and stress analysis
- **Cylinders** - Load a stresses in typical cylinder configurations, autofrettage and compound cylinders.
- **Pressure vessels** - Design, corrosion, welded joint efficiency, pipes and flanges, inspection openings and supports.
- **Motors** - Introduction to squirrel cage motors, torque-speed characteristics, couplings.
- **V-belts** - usage, mounting geometry, drive selection and traction mechanics.
- **Brakes and Clutches** -introduction to common types, linings, brake dynamics and use on vehicles.
- **Spur Gears** - Discussion of common types, involutes, design of gear trains.

Design Cookbook

[MIT/CUED/MDP]


Hair Trigger
Ground Link
Trigger face radius above pivot
Note - The magnitude of L2 controls the sensitivity. The system become metastable as
Ways to trigger a large force with a small one
1) Leverage - lever increases pulling force

Collection of notes describing for use by students undertaking 'mechanism/Robotic' work in a workshop, topics covered include

- **Machine Elements** - Pivots, Sliding Bearings, Trigger Mechanisms, Wheel Designs, Pulley Drives etc.
- **manufacturing** -. Safety, Tapping and screwing, machining rigid plastics ...

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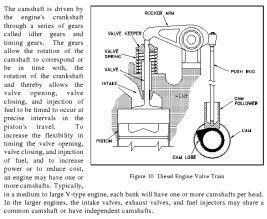
- **Joining and Fastening techniques** - Adhesive/riveted/stapled joints, quick-disconnect fasteners ...
- **Calculations** - Tips for Doing Calculations, examples

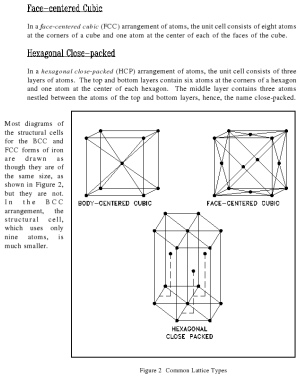
Fundamentals Handbook -Mechanical Science
[Public Release/Permission]


The camshaft is driven by the engine's crankshaft through a series of gears called idler gears and timing gears. The gears allow the rotation of the camshaft to correspond or be in time with, the rotation of the crankshaft and thereby allows the valve opening, valve closing, and injection of fuel to be timed to occur at precise intervals in the piston's travel. To increase the flexibility in timing the valve opening, valve closing, and injection of fuel, and to increase power or to reduce cost, an engine may have one or more camshafts. Typically, in a medium to large V-type engine, each bank will have one or more camshafts per head. In the larger engines, the intake valves, exhaust valves, and fuel injectors may share a common camshaft or have independent camshafts.
ROCKER ARM
VALVE KEEPER
VALVE SPRING
VALVE
INTAKE
EXHAUST
PUSH ROD
CAM FOLLOWER
CAM
PISTON
CAM LOBE
Figure 10 Diesel Engine Valve Train

Five modules, in 2 volumes, (total ~ 250 pages) covering the basics of the areas

1. **Diesel Engine Fundamentals** - basic operation of diesel engine and associated computer, e.g. governors, injectors.
2. **Heat Exchangers** - Terminology, types of exchangers, and applications
3. **Pumps** - Description of types of centrifugal and positive displacement pumps and their usage.
4. **Valves** - Operation, type (e.g. Gate, Ball, Plug, Diaphragm...) and methods of actuation.
5. **Mechanical components** - Description and Operation of various mechanical components/systems including, air compressors, seam traps, boilers

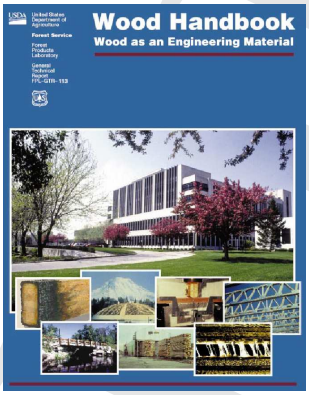
Fundamentals Handbook - Material Science
[Public Release/Permission]


Face-centered Cubic
In a face-centered cubic (FCC) arrangement of atoms, the unit cell consists of eight atoms at the corners of a cube and one atom at the center of each of the faces of the cube.
Hexagonal Close-packed
In a hexagonal close-packed (HCP) arrangement of atoms, the unit cell consists of three layers of atoms. The top and bottom layers contain six atoms at the corners of a hexagon and one atom at the center of each hexagon. The middle layer contains three atoms nestled between the atoms of the top and bottom layers, hence, the name close-packed.
Most diagrams of the structural cells for the BCC and FCC forms of iron are drawn as though they are of the same size, as shown in Figure 2, but they are not. In the BCC arrangement, the structural cell, which uses only nine atoms, is much smaller.
BODY-CENTERED CUBIC
FACE-CENTERED CUBIC
HEXAGONAL CLOSE-PACKED
Figure 2 Common Lattice Types

Five modules, in 2 volumes, (total ~ 200 pages) covering the basics of the areas

1. **Structure of Metals** - Atomic bonding, lattice structure, alloys, defects. Properties of metals
2. **Properties of Metals** - Stress-strain relationship, UTS, Heat treatment, Corrosion, embrittlement.
3. **Thermal Shock**
4. **Brittle Fracture** - mechanism, fracture toughness
5. **Plant materials** - Description and Operation of various mechanical components/systems including, air compressors, seam traps, boilers

Wood Handbook
[Public Release/Permission]



Published by the US Dept. of Agriculture the book contains detailed information on :-

- Commercially used woods
- Physical and mechanical properties of many species of wood
- Lumber grades and design properties
- Jointing techniques (inc. fasteners/glue)
- Finishing and preservation techniques
- Fire safety considerations
- Usages of wood as structural elements in buildings

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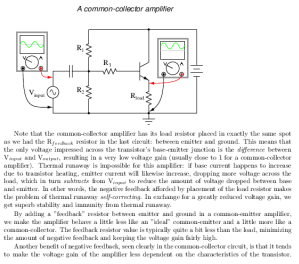
V.4 Electrical, Electronics and Instrumentation

Electrical, Electronic and Instrumentation resources and databooks.

Lessons in electric circuits
[Design Science]


A common-collector amplifier

Note that the common-collector amplifier has its load resistor placed in exactly the same spot as we had the $R_{feedback}$ resistor in the last circuit: between emitter and ground. This means that the only voltage impressed across the transistor's base-emitter junction is the *difference* between V_{input} and V_{output}, resulting in a very low voltage gain (usually close to 1 for a common-collector amplifier). Thermal runaway is impossible for this amplifier: if base current happens to increase due to transistor heating, emitter current will likewise increase, dropping more voltage across the load, which in turn *subtracts* from V_{input} to reduce the amount of voltage dropped between base and emitter. In other words, the negative feedback afforded by placement of the load resistor makes the problem of thermal runaway *self-correcting*. In exchange for a greatly reduced voltage gain, we get superb stability and immunity from thermal runaway.

By adding a "feedback" resistor between emitter and ground in a common-emitter amplifier, we make the amplifier behave a little less like an "ideal" common-emitter and a little more like a common-collector. The feedback resistor value is typically quite a bit less than the load, minimizing the amount of negative feedback and keeping the voltage gain fairly high.

Another benefit of negative feedback, seen clearly in the common-collector circuit, is that it tends to make the voltage gain of the amplifier less dependent on the characteristics of the transistor.

A six volume (total 2300 pages) introduction to electrical/electronic circuits.

1. **DC Circuits**
2. **AC Circuits**
3. **Semiconductors**
4. **Digital Circuits**
5. **Reference Information**
6. **Experiments**

Fundamentals Handbook - Electrical Science
[Public Release/Permission]

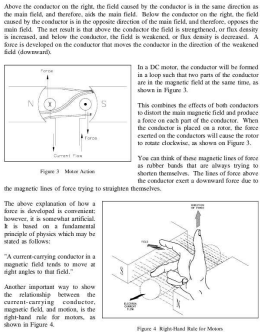

Above the conductor on the right, the field caused by the conductor is in the same direction as the main field, and therefore, aids the main field. Below the conductor on the right, the field caused by the conductor is in the opposite direction of the main field, and therefore, opposes the main field. The net result is that above the conductor the field is strengthened, or flux density is increased, and below the conductor, the field is weakened, or flux density is decreased. A force is developed on the conductor that moves the conductor in the direction of the weakened field (downward).

Figure 3 Motor Action

In a DC motor, the conductor will be formed in a loop such that two parts of the conductor are in the magnetic field at the same time, as shown in Figure 3.

This combines the effects of both conductors to distort the main magnetic field and produce a force on each part of the conductor. When the conductor is placed on a rotor, the force exerted on the conductors will cause the rotor to rotate clockwise, as shown on Figure 3.

You can think of these magnetic lines of force as rubber bands that are always trying to shorten themselves. The lines of force above the conductor exert a downward force due to the magnetic lines of force trying to straighten themselves.

The above explanation of how a force is developed is convenient; however, it is somewhat artificial. It is based on a fundamental principle of physics which may be stated as follows:

"A current-carrying conductor in a magnetic field tends to move at right angles to that field."

Another important way to show the relationship between the current-carrying conductor, magnetic field, and motion, is the right-hand rule for motors, as shown in Figure 4.

Figure 4 Right-Hand Rule for Motors

Four volumes (total $\sim$ 540 pages) covering the basics of the areas

- **Basic Electrical Theory** - Atoms/forces, Terminology, Electrical units, Electrical generation, magnetism, electrical symbols
- **Basic DC Theory** - DC sources, DC circuit calcs, Kirchoff's law, circuit analysis
- **DC Circuits** - Inductance, Capacitance
- **Batteries, DC Motors** - Terminology, theory, battery types
- **AC theory, Components and generators**
- **AC Motors, transformers and distribution systems**

Op Amps for Everyone
[permission]

Detailed analysis of the internal structure of operational amplifiers together with analysis of the noise levels, input/output impedances and bandwidths.

Handbook of Operational Amplifiers Applications
[permission]

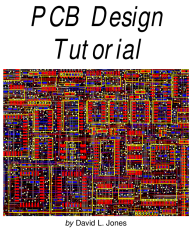
Introduction to operational amplifiers and descriptions of most of the standard circuits and usages.

Introduction to Microprocessors

An web based introduction to microprocessors that is designed to match a corresponding set of lecture notes and practicals based on the MDP/Balloon microprocessor system, see section VI.

DRAFT

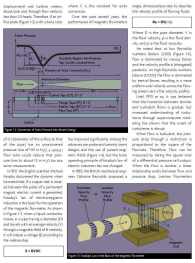
PCB Design Tutorial
[author]
www.alternatezone.com



Short form design manual for PCB construction, covering aspects of:

- Schematics
- Design rules for PCB layout, tracks, vias
- Details for ground planes, auto routing and track loading
- Design for manufacture - Panelisation, tooling and testing

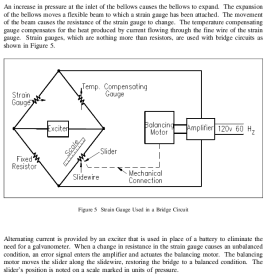
Transactions
[Permission]
http://www.omega.com



Four volume monograph by Omega Engineering on standard instrumentation techniques. Each measurement topic is covered in detail discussing the underlying physics, sensor ranges/accuracy/repeatability.

- **Vol. I** Non-contact temperature measurement
- **Vol. II** Data acquisition
- **Vol. III** Force-related strain gauge, pressure, vacuum, force/acceleration/load cells
- **Vol. IV** Flow and Level measurement

Fundamentals Handbook - Instrumentation and Control
[Public Release/Permission]
http://www.energy.gov



Four volumes (total $\sim$ 540 pages) covering the basics of the areas

- **Temperature Detectors** - RTD, thermocouples, detection circuits
- **Pressure sensors**
- **level sensors**
- **Flow detectors**
- **Position sensors**
- **Radiation detectors** - inc proportional counters, Geiger-Müller and scintillation.

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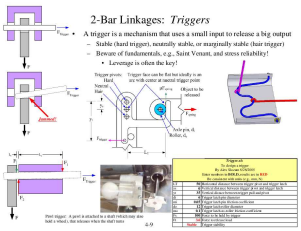
V.5 Design and Manufacture

Information on Design and Manufacture.

FUNdaMENTALS of Design

[author]

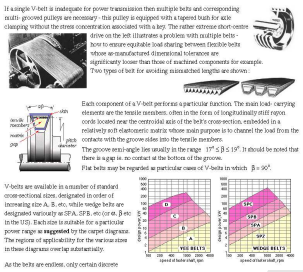


Introduction to the design process with details on see section Materials and Mechanical (V.3) for more information on chapters marked *. Written by Prof. A. Slocum to complement the MIT 2.007 course and other design and build mechtronics courses.

- **Design is a Passionate Process (ch 1)**
- **Creating Ideas (ch 2)**
- **FUNdaMENTAL Principles (ch 3)**
- *__Linkages (ch 4)__
- *__Power Transmission Elements I (ch 5)__
- *__Power Transmission Elements II (ch 6)__
- **Power Systems (ch 7)**
- **Structures (ch 8)**
- **Structural Connections Interfaces (ch 9)**
- * **Bearings (ch 10)**

Design and Analysis of Machine elements

[author]

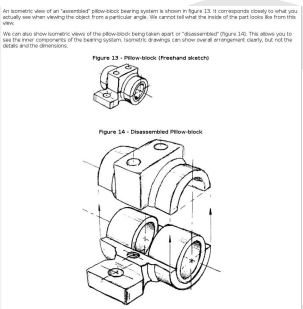


Extensive HTML resource which covers the introduction and details on a range of mechanical components (see also the Mechanics section V.5 for further details for items marked *). Topics covered include

- **Design** - What is design? constraints & criteria, feasibility, creativity.
- **Stress, Strength & Safety** - Safety factors, failure theories.
- ***Springs** - ***Threaded Fasteners** - ***Welded Joints** - ***Cylinders** - ***Pressure vessels** - ***Motors** - ***V-belts** - ***Brakes and Clutches** - ***Spur Gears** - ***Fracture Mechanics**
- **Finite Elements** - Introduction to Finite element theory with application to linear elastic problems. (See application Aster [section III.11] for FEA package in EDaL)

Engineering Drawing and Sketching

[MIT/MDP]



Introduction to using manual drawing to convey design ideas and generate detailed orthographic drawings. Topics covered include

- Isometric & orthographic drawings
- Detailed drawings, dimensioning and sectioning
- Assembly drawings

(N.B. See section IV.2 for details on documentation and tutorials on the production of 2D and 3D CAD models/drawings using the applications [section III.7] supplied as part of the EDaL system.)

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Fundamentals Handbook - Engineering Symbology

[Public Release/Permission]

Two volumes (total $\sim$ 200 pages) covering the basics of drawing including how to read a drawing, engineering symbols for mechanical, electrical and fluid engineering. Details on layout for construction, mechanical and electrical diagrams.

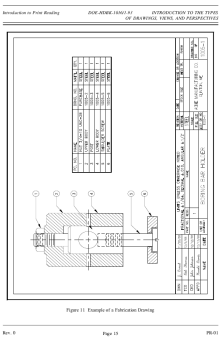

Figure 11 Example of a Fabrication Drawing

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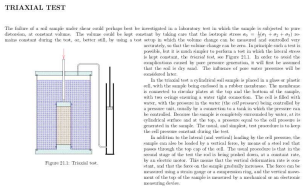
V.6 Civil and Structural

Civil and Structural Engineering resources and databooks.

Soil Mechanics
[Open]


TRIAXIAL TEST

The failure of a soil sample under shear could perhaps best be investigated in a laboratory test in which the sample is subjected to pure distortion, at constant volume. The volume could be kept constant by taking care that the isotropic stress $\sigma_3 = \frac{1}{3}(\sigma_1 + \sigma_2 + \sigma_3)$ remains constant during the test, or, better still, by using a test setup in which the volume change can be sensed and controlled very accurately, so that the volume change can be zero. In principle such a test is possible, but it is much simpler to perform a test in which the lateral stress is kept constant, the triaxial test, see Figure 21.1. In order to avoid the complications caused by pore pressure generation, it will first be assumed that the soil is dry, or moist. The influence of pore water pressures will be examined later.

In the triaxial test a cylindrical soil sample is placed in a glass or plastic cell, with the sample being enclosed in a rubber membrane. The membrane is connected to circular plates at the top and the bottom of the sample, and the cell is filled with water. The cell is closed at the top by a plastic lid. The water, with the pressure in the water (the cell pressure) being controlled by a pressure unit, usually by a connection to a tank in which the pressure can be controlled. Because the sample is completely surrounded by water, at its cylindrical surface and at the top, a pressure equal to the cell pressure is exerted on the sample. In a drained triaxial test, procedure is to keep the cell pressure constant during the test.

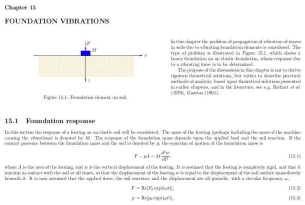
In addition to the lateral (and vertical) loading by the cell pressure, the sample can also be loaded by a vertical force, by means of a steel rod that passes through the top cap of the cell. The usual procedure is that in the drained test the force is applied in such a way that the deformation is kept by an electric motor. This means that the vertical deformation rate is constant, and that the force on the sample gradually increases. The force can be measured using a strain gauge or a compression ring, and the vertical movement of the top of the sample is measured by a mechanical or an electronic measuring device.

Figure 21.1: Triaxial test.

Text book originally written by the author, Prof. A. Verruijt, to compliment an introduction to soil mechanics course given at the University of Delft. The book gives an introduction to the subject covering details including:

- Soil classification
- Darcy's law, groundwater, wells
- Stress-Strain relationships, Mohr-Coulomb, testing and pore pressure

Soil Dynamics
[Open]


Chapter 15

FOUNDATION VIBRATIONS

In this chapter the problem of propagation of vibration of waves in soils due to vibrating foundation elements is considered. The type of problem is illustrated in Figure 15.1, which shows a foundation element on the surface of a soil mass, whose response due to a vibrating force is to be determined.

The purpose of the electromagnetic this chapter is not to derive rigorous theoretical solutions, but rather to describe practical methods of analysis, based upon theoretical solutions presented in earlier chapters, and in the literature, see e.g. Richart et al. (1970), Gazetas (1983).

Figure 15.1: Foundation element on soil.

15.1 Foundation response

In this section the response of a footing on an elastic soil will be considered. The mass of the footing (perhaps including the mass of the machine causing the vibrations) is denoted by M. The response of the foundation mass depends upon the applied load and the soil reaction. If the contact pressure between the foundation mass and the soil is denoted by p, the equation of motion of the foundation mass is

$$F - pA = M\frac{d^2w}{dt^2}, \tag{15.1}$$

where A is the area of the footing, and w is the vertical displacement of the footing. It is assumed that the footing is completely rigid, and that it remains in contact with the soil at all times, so that the displacement of the footing, w is equal to the displacement of the soil surface immediately beneath it. It is now assumed that the applied force, the soil reaction, and the displacement are all periodic, with a circular frequency ω,

$$F = \Re\{F_0 \exp(i\omega t)\}, \tag{15.2}$$

$$p = \Re\{p_0 \exp(i\omega t)\}, \tag{15.3}$$

Based on a course on Soil Dynamics the book covers basic principles of elastodynamics of soils and the major solutions of problems of interest for geotechnical engineering.

Starting with a introduction to vibrating systems the topics covered include:

- Waves in Piles
- Consolidation
- Plane, cylindrical and spherical waves
- Foundation vibrations

Offshore Soil Mechanics

Text book extending the coverage of the two books above and applying the principles to offshore engineering problems.

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V.7 Computing and Maths

Manuals and formulae books for Computing and Maths

Linux Guides
[gpl]

1 Introduction to Linux - A Hands on Guide
2 Pocket Linux Guide
3 Linux Command-line Tools

Three guides generated as part of the Linux documentation project that have been included to give the user who wishes to investigate the Linux system some starting material.

Calculus
[Creative Commons/ permission]

'Calculus' starts with simple gradients and slowly progresses through differentiation, integration, complex numbers and double integrals. It has been written as a 'gentle introduction to calculus'!

Elementary Calculus
[Creative Commons]

Mathematical Tools for Physics
[Author]

A $>$ 400 page overview of mathematics suitable for physics/applied maths/engineering students, book covering:

1 Basic Stuff
2 Infinite Series
3 Complex Algebra
4 Differential Equations
5 Fourier Series
6 Vector Spaces
7 Operators and Matrices
8 Multivariable Calculus
9 Vector Calculus 1
10 Partial Differential Equations
11 Numerical Analysis
12 Tensors
13 Vector Calculus 2
14 Complex Variables
15 Fourier Analysis
16 Calculus of Variations
17 Densities and Distributions

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V.8 Monographs and General Textbooks etc.

Monographs on sustainable development, entrepreneurship etc. and textbooks on Physics and Chemistry

How to Write a Paper

[author]

This brief manual gives guidance in writing a paper about the author's research. Most of the advice applies equally to writing a thesis or a research proposal. Materials project, combining experiment with modelling and computation to explain some aspect of material behaviour is used as example.

Starting a Technology Company

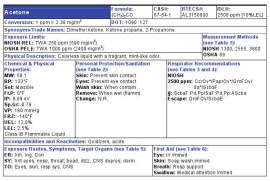
[author]

Developed as part of a CMI project, 'Starting a technology company' is a practical guide for anyone interested in setting up a science-based company.

Although based from a Cambridge point of view the main ideas carry over to any location. Split into three parts experts give advice on evaluating business ideas and looking at personal and company objectives. Then advice is given on 'Getting going' and then actually keeping the company going during the early stages.

NIOSH Pocket Guide to Chemical Hazards

[author]



The Pocket Guide presents key health and safety information and data on over 650 commonly used chemicals. Designed for the US area the basic data is common through out the world although if safety critical users should check local exposure limits and working conditions.

Simple Nature

[Creative Commons/ Permission]

Simple Nature is a introductory physics book for engineering students covering

1 Introduction
2 Conservation of Mass
3 Conservation of Energy
4 Conservation of Momentum
5 Conservation of Angular Momentum
6 Thermodynamics
7 Waves
8 Relativity
9 Atoms and Electromagnetism
10 DC Circuits
11 Electromagnetism
12 Optics
13 Quantum Physics

Fundamentals Handbook - Classical Physics

[Public Release/Permission]

Short introduction to physics including modules on units, vectors, theory/application of Newton's laws and energy/work/power.

Fundamentals Handbook - Chemistry

[Public Release/Permission]

Two volumes covering the basics of physical, inorganic and organic chemistry, including modules on: Characteristic of atoms, chemical bonding acids/bases/salts, separation, water treatment.

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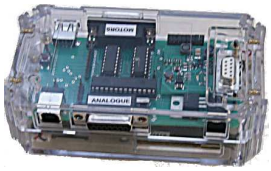
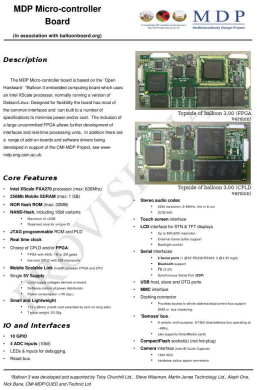
VI. Microprocessor




MDP Micro-controller Board

(In association with balloonboard.org)

MDP

Description

This MDP Micro-controller board is based on the 'Open Hardware' 'Balloon 3' embedded computing board which uses an Intel XScale processor, normally running a version of Debian/Linux. Designed for flexibility the board has most of the common interfaces and can built to a number of specifications to minimise power and/or cost. The inclusion of a large uncommitted FPGA allows further development of interfaces and real-time processing units. In addition there are a range of add on boards and software drivers being developed in support of the CAI-MDP Project, see www-mdp.eng.cam.ac.uk.

Torpidin of balloon 3.00 (FPGA Version)

Torpidin of balloon 3.00 (CPLD Version)

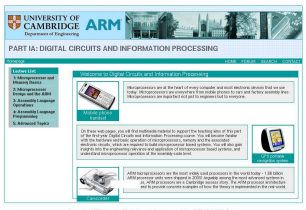
Core Features

- Intel XScale PXA270 processor (max: 624Mhz)
- 256Mb Mobile SDRAM (max: 1 GB)
- NOR flash ROM (max: 32MB)
- NAND-flash, including 1Gbit variants
  - Bootloader in USB
  - Reserved area for Unique ID
- JTAG programmable ROM and PLD
- Real time clock
- Choice of CPLD and/or FPGA:
  - FPGA with 400k - 1Mgs SW gates
  - Ivan said (FPGA) with USB connectivity
- Mobile Scalable Link (mutli-purpose FPGA and CPU)
- Single 5V Supply
  - Option supply compact demand on board
  - Software control of power distribution
  - Power consumption < 2W (typ.)
- Small and Lightweight
  - PCB 80mm square (unit extended by 2cm on long side)
  - Typical weight 20-30g

IO and Interfaces

- 10 GPIO
- 4 ADC Inputs (10bit)
- LEDs & Inputs for debugging.
- Reset bus.
- Stereo audio codec
  - 20bit resolution, 8-96kHz, line in & out
  - SCM-MIC
- Touch screen interface
- LCD interface for STN & TFT displays
  - Up to 800x600 resolution.
  - External frame buffer support
  - Backlight control
- Serial interfaces
  - 3 UART ports (1 @5V RS232/RS422, 2 @3.3V logic)
  - Bluetooth support
  - I²C (3.3V)
  - Synchronous Serial Port (SSP)
- USB host, slave and OTG ports
- MMC interface
- Docking connector
  - Provides access to whole address/data/control bus support SRAM on bus mastering.
- Samsung2 bus.
  - A simple, multi-purpose 32-bit data/address bus operating at 3.3V
  - Can support SmartMedia cards
- CompactFlash socket(s) (incl hot-plug)
- Camera interface (new IR Scott Gadcher)
  - Intel ACC
  - hardware colour space conversion

"Balloon 3 was developed and supported by Toby Churchill Ltd., Steve Weerman, Martin-Jones Technology Ltd., Akash Ono, Nick Bane, CMI MDP/CUED and iTechnic Ltd


UNIVERSITY OF CAMBRIDGE
Department of Engineering
ARM
PART IA: DIGITAL CIRCUITS AND INFORMATION PROCESSING
Welcome to Digital Circuits and Information Processing

As part of the MDP a joint project has been undertaken with the Balloon-Board.org to develop an Open Hardware Design low cost microprocessor/controller system. The system has been designed to enable universities/colleges etc to use a single platform for in a range of applications from microcomputer fundamentals through system control and programming for embedded processors to fpga programming and serious data acquisition systems.

Included on the EDaL system is:

- Information on the microprocessor system, inc. specifications
- Details on the currently available add-on boards, with ECAD documents for the borads that have been used in student projects.
- Information on the software libraries and ARM assembler simulator, see section III.13.2

Note also the web-based introduction to microprocessors, and ARM based varieties in particular, found in the library section V.4.

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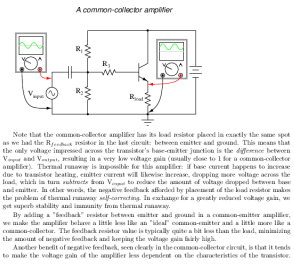
VII. Teaching resources

Design Fundamentals
[Author/Permission]


A common-collector amplifier
R_1
R_2
R_3
V_{signal}
R_{load}
Note that the common-collector amplifier has its load resistor placed in exactly the same spot as we had the $R_{1,collector}$ resistor in the last circuit: between emitter and ground. This means that the only voltage impressed across the transistor's base-emitter junction is the *difference* between V_{signal} and V_{output}, resulting in a very low voltage gain (usually close to 1 for a common-collector amplifier). Thermal runaway is impossible for this amplifier: if base current happens to increase due to transistor heating, emitter current will likewise increase, dropping more voltage across the load, which in turn *subtracts* from V_{signal} to reduce the amount of voltage dropped between base and emitter. In other words, the negative feedback afforded by placement of the load resistor makes the problem of thermal runaway *self-correcting*. In exchange for a greatly reduced voltage gain, we get superb stability and immunity from thermal runaway.
By adding a "feedback" resistor between emitter and ground in a common-emitter amplifier, we make the amplifier behave a little less like an "ideal" common-emitter and a little more like a common-collector. The feedback resistor value is typically quite a bit less than the load, minimizing the amount of negative feedback and keeping the voltage gain fairly high.
Another benefit of negative feedback, seen clearly in the common-collector circuit, is that it tends to make the voltage gain of the amplifier less dependent on the characteristics of the transistor.

Slides covering an introduction to design and mechanical components using as a base the MIT 2.007 course and the 'Design Fundamentals' book, see V.5.

Lecture 1 Design is a Process

Lecture 2 Creation of Ideas

Lecture 3 Fundamental Mechanical Design Principles

Lecture 4 Linkages

Lecture 5 Power Transmission Components

Lecture 6 Screws and Gears

Lecture 7 Force, Torque and Power Sources

Lecture 8 Structures

Lecture 9 Structural Interfaces

Lecture 10 Designing with Bearings

Additional Lectures x

- Ethics
- Screws, Gears, and Power Budget Example
- Motor Calculations and Power Budget Example

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VIII. Advanced Setup & Configuration

VIII.1 Startup/Boot configuration

Boot sequence

VIII.1.1 CD/DVD/USB Boot order

Some systems are set to to start directly from hard disk in preference to the CD or DVD drive or USB. However, it is possible to to change some settings on your computer's start-up sequence (often called the "boot sequence") to ensure that it checks the optical/CDROM drive before starting from a hard disk.

Current session ONLY

Certain makes of more recent computers allow the user to change the boot sequence for only the session being started. As described in section II.2.1 this is commonly accessed by pressing the function key *f12* while booting. Normally a message is put on the screen to indicate to the user the key to press while the initial processing bar is being shown. Once pressed the screen will normally change to show a numeric list of options, enter the number most appropriate and the system should then boot from that device.

'Permanent' boot order change

How you 'permanently' change the settings depends on your computer, but this can normally be done by holding down one of the function keys or **Delete** or **Esc** at the prompt that appears just after the computer has turned on or been reset. This should present you with a menu of various options.

You now need to find where your computer specifies its "boot" options and change them so that it tries to boot from a CD before it boots off the hard-disk. How this is achieved varies considerably from computer to computer, so it may be a good idea to consult your computer's manual if it's available. A suitable boot order might be:

- 1st Device: Floppy Disk (If the system has one)
- 2nd Device: USB (If the option is available)
- 3rd Device: CDROM
- 4th Device: Hard Disk Drive

Once you have made the changes, make sure that you save them before you exit the setup menus. It may be necessary to reboot the machine again to ensure the changes are actioned.

N.B. The process is reversible by selecting the option at a subsequent re-boot and returning the boot selections to the original order

Warning Changing you boot order can effect the way your system behaves in the event of a hardware failure. If concerned please contact your computer administrator, before changing the order.

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VIII.2 Screen and Power management configuration)

The EDaL system interrogates the computer as it boots and attempts to set up all the peripherals automatically. In certain circumstances information can be missed or incorrectly read leading to the system booting slowly or even hanging. To overcome some of these problems it is possible to enter one or more commands called 'cheat codes' at the boot prompt that force particular setup options to be chosen. The list below takes the user through a sequence to maximise the functionality available to the system.

1. **No Boot from CD/DVD** :Change boot sequence, section VIII.1.1 or boot from floppy, see on-line information available from windows environment.
2. **Interrupt Controller problems** : On some systems there can be problems with the APIC. Reboot and type *knoppix noapic* at the boot prompt.
3. **PCI bus problems Interrupt Controller problems** : Reboot and type *knoppix pci=bios* at the boot prompt.
4. **Hangs after searching disks** : Reboot and type *Knoppix noscsi* at the boot prompt (N.B. Stops access to USB memory sticks)
5. **Multiple problems / Laptops** it is possible to combine 'Cheatcodes', e.g an common solution is *knoppix acpi=off pnpbios=off noapic pci=bios*. *knoppix acpi=off pnpbios=off noapic noapm* often works with problematic laptops.
6. **Failsafe mode** : If none of the above 'cheatcodes' enable booting, try the option *knoppix failsafe*. This will attempt tp start the system in a minimum configuration.

If *failsafe* results in a complete boot it is probable that a less restrictive option is possible with a certain amount of detective work. A complete list of cheatcodes are available at the boot prompt and there are also additional information on the MDP website and the knoppix.net website at *http://www.knoppix.net/wiki/Cheat_Codes*. A list of the more common options are given below.

knoppix module=fbdev	Forces the system to use a framebuffer
knoppix screen=1600x1200	Force screen resolution (typ options 800x600, 1024x768, 1280x1024)
knoppix depth=16	Force colour depth on screen (typ values 8,16,24,32)
knoppix (no)wheelmouse	Force driver for mouse with or without wheel
knoppix mem=128M	Force knoppix to use available memory (typ. values 256M, 512M, 1G)
knoppix (no)apm	Switch Automatic Power Management off/**On**
knoppix (no)firewire	Switch Firewire detection off/**On**
knoppix (no)swap	Switch swap detection off/**On**
knoppix (no)pcmcia	Switch pcmicia detection off/**On**
knoppix (no)audio	Switch audio detection off/**On**
knoppix dma	Enable DMA on all IDE drives
knoppix alsa	Use ALSA sound driver

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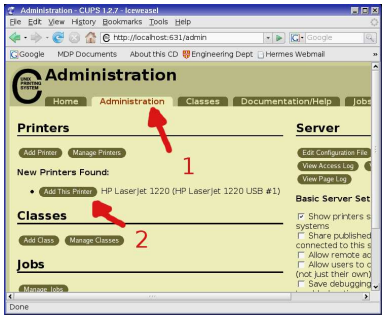
VIII.3 Printer Configuration

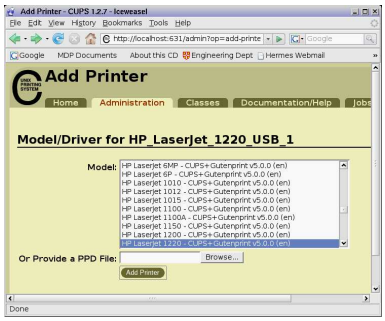
VIII.3.1 CUPS wizard

When the *Configure Printer* option is selected from the setting menu the system starts a browser window pointing at the local CUPS (Common UNIX Printing System) pages. These pages contain help information, display of the printer(s) status and a set-up wizard accessed from the *Administration* tab.



1. **Select Printer**

   The initial gives access to a number of sections of the CUPS system, but the area at the top left, under **Printers**, is the area of interest. Any attached printer will be shown in the *New printers Found* list. Select *Add This Printer* corresponding to the printer you wish to use.

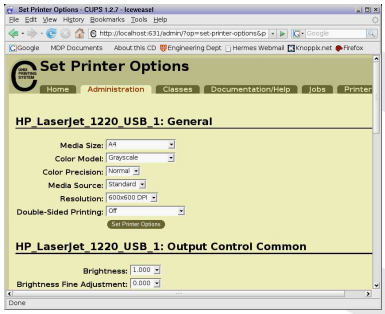


2. **Select Printer Driver**

   The user is then presented with a long list of available printer drivers, scroll to the appropriate one for the selected printer and press *Add printer*. Normally the system selects the correct driver automatically and the scroll/selection process can be omitted.

   If there is no suitable driver the option is given to browse for a user supplied PPD (Postscript Printer Definition) file. (NB Even non postscript printers need one.)

   Once selected the screen will indicate that the printer has been added and after a couple of second the printer options page will appear. if the notice is selected the Printers Control page will be shown, see below.



3. **Printer Options**

   This page allows the user to set-up the default printer configuration, e.g. paper size, print resolution.

4. **Printer Control**

   Accessed through the *Printers* tab the page shows all the connected printers and their type, printing status, network address etc and access to a number of direct control features to each printer. It is a good idea for the user to *Set As Default* the printer they normally use. If a job is printer incorrectly it can be stopped by selecting the *Reject Jobs* button from this page.

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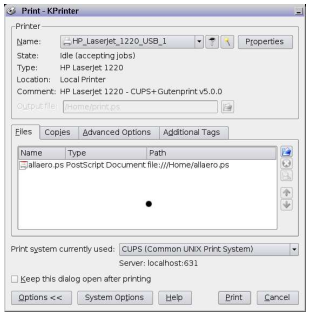
Print Options - Kprinter

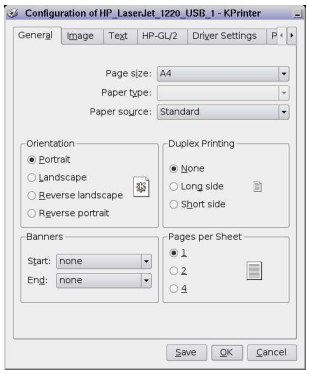


kprinter main window

The default printing system for most applications in the EDaL system is *lpr* the standard Linux printer system. However this is a command-line drive application and so a GUI has been included to access specific printer functionality. If at a print prompt `lpr` is replaced by `kpr` the kprinter interface will start.

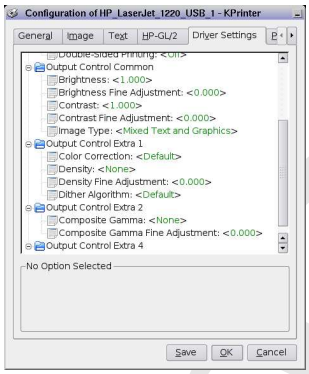
The interface give the user access to set standard print options by

1. **Printer Options**
   - *Properties* direct access to the printer setup, see 2.
   - *Files* Add files to the printer queue, delete and reorder files in the queue.
   - *Copies* Print range and number of copies required.
   - *Advanced Options* Printer scheduling
   - *Additional Tags* Labels for print jobs



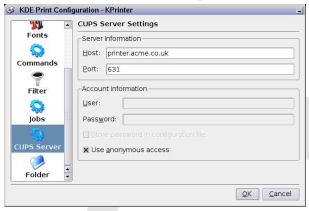
2. **Printer Properties**

   Selected by the 'Properties' but at the top left of the menu, this initially gives access to the 'General' part of the printer options. Here the page size, orientation, number of pages/sheet etc can be selected.



3. **Driver Settings**

   More detailed printer settings, where available, can be set via the other tab options. However the most used is probably the `Driver Settings` tab which give access to the detailed printer settings including finishing options on more complicated devices, e.g. folding, stapling etc.



4. **System Options**

   The 'System Options' button at the bottom of the main menu gives the user access to the main KPrinter configuration menu. Although most options should be left as default it can be useful to change the CUPS Server when access is available across the network.

   Select the CUPS Server option from the left hand menu and then enter the host address, e.g. `print-server.acme.co.uk`. Normally the port number is 631. Should it be needed to rest it to the local machine, enter the Host as `localhost`.

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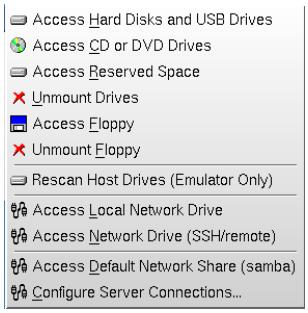
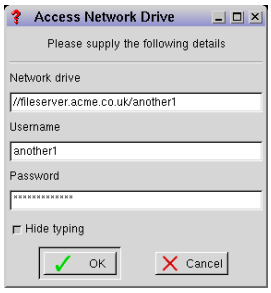
VIII.4 Setting up Disc Access



As indicated in section II.3.4 general access to most of the disks available to a EDaL system is available via the desktop or file manager interfaces. However, a series of more detailed text based access schemes are available via :

Start $Rightarrow$ Settings $\Rightarrow$Disks

- **Access Hard Disks and USB Drives** gives a menu listing all the drives that have been detected by the system and offers the user the opportunity to 'mount' them, e.g. allowing access to read/write from them.
- **Access CD or DVD Drives** mounts optical drives. N.B. if the EDaL system is being run from a CD or DVD the user will not be able to use another disk in that drive.
- **Access Reserved Space** if the user has set-up an area of 'Reserved Space' on a native disk this option will give direct access.
- **Unmount Drives** Direct access to the menu giving options to unmount including network drives.
- **Rescan Host Drives** When operating the EDaL system in the Qemu emulator the system may not automatically register a disk newly mounted in the host operating system. 'Rescanning' will attempt to make any disk mounted by the host system accessible.



- **Access Local Network Drive** will take the user through a wizard to access local , typically on the same network, disk systems accessible via Samba. The users is first prompted for the `Network drive`, e.g. `//fileserver.acme.co.uk/another1`, and then the username and password of a users who is permitted to access the directory/files.

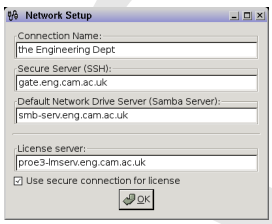
  A subsequent menu prompts the user to enter and then select the name of the directory under which the network drive will become accessible.

- **user through a Access Network Drive (SSH/remote**

  This option is similar to the option above but uses the SSH encrypted protocol to route the traffic between the EDaL system and the remote server. SSH is often used on systems that are accessed via the public Internet to improve security.

- **Access Default Network Share (samba)**

  In organisations that have a default Samba server the EDaL system enables users to automatically access their remote files by only having to enter their username and password. the remote system will appear in a directory, with the name of the individuals username in the /Home directory.



- **Configure Server Connections**

  This option allows a system to be preset connections. In particular, access to the users home network system, default samba server and if used license server. This last option is normally only used if commercial software is used, e.g Pro/Engineer.

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MDP reserved area for NTFS discs (Windows NT/2000/XP/Vista)

Originally the MDP EDaL system had difficulty directly writing to NTFS discs (those found in Windows 2000/NT/XP and Vista machines). A system using a 'MDP reserved area' was employed, see the help section on the disk for further information on how to access it on legacy systems.

VIII.4.1 Mounted Discs/disc names

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Drive names

Users may be familiar with the Microsoft Windows' naming scheme for disk drives. For example, "drive A:" for the first floppy drive; "drive C:" for the first visible hard drive partition, and so on. The EDaL system has its own drive naming scheme, based on the one derived from Debian/Knoppix, except when running under emulations e.g.

CD/DVD or USB booted systems .

Disk types The naming scheme starts with a two-letter code for the type of disk.

Name	Drive type
fd	Conventional floppy drive
hd	Integrated Drive Electronics (IDE) drive
sd	Small Computer System Interface (SCSI) drive

IDE drives IDE drives are the most common in desktop PCs and laptops. A single letter indicates how the drive is connected. Most PCs and laptops have two IDE channels: primary and secondary. Each channel can have up to two devices: master and slave.

Name	IDE drive
hda	Primary Master
hdb	Primary Slave
hdc	Secondary Master
hdd	Secondary Slave

SCSI drives For SCSI drives, a single letter indicates its location. This is called its position in the SCSI chain. SCSI hard drives are usually found in servers. Zip, USB and Firewire drives are also treated as SCSI drives.

Name	SCSI drive location
sda	First SCSI drive
sdb	Second SCSI drive
sdc	Third SCSI drive

Disk partitions IDE and SCSI hard drives are divided into partitions. Zip, USB and Firewire drives also contain partitions. A partition is like a compartment within a disk. There may be a single partition that covers the entire disk. There may be more than one partition. Each partition is indicated by a number.

Name	Drive	Partition
hda1	Primary master IDE drive	First partition
hda2	Primary master IDE drive	Second partition
hda3	Primary master IDE drive	Third partition

IDE CD-ROM drives IDE CD-ROM drives are treated as SCSI drives. This is called SCSI emulation. SCSI emulation is there so that CD burning

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applications can use the same language to talk to SCSI and IDE drives.

Name	CD-ROM drive
scd0	First CD-ROM drive
scd1	Second CD-ROM drive
scd2	Third CD-ROM drive

Floppy drives For ordinary floppy disk drives, a number shows the drive number.

Name	Floppy drive number
fd0	First floppy drive
fd1	Second floppy drive

Running under Qemu When the system is run using the Qemu emulator the option of accessing the host machines discs via NFS during the start-up wizard. If this option is taken drives mounted by the host system are accessible under their host letter in the /Drives directory irrespective of their type, e.g. typically,

Host Floppy	
:A	/Drive/a
Host Hard Disc	
:C	/Drive/c
Host Optical Disc	
:D	/Drive/d
Host USB Stick	
:E	/Drive/e

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VIII.5 Internet access

The main ways to get connected to the Internet are:

- Direct ethernet connection via local area network.
- Ethernet gateway, router.
- External serial modem.
- PCMCIA serial cardbus modem.

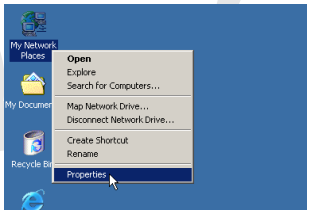
the EDaL system is designed first and foremost for wired Ethernet networking. This gives you the best chance of success. Meanwhile, the following connection methods may

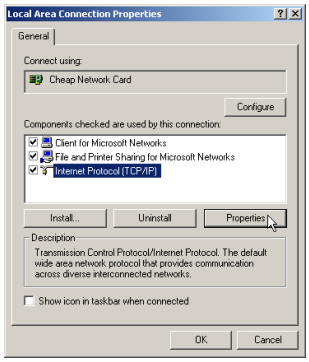
- Most internal PCI dial-up
- Most external USB broadband modems.
- Most wireless (802.11) PCI and PCMCIA cards.
- Some PCMCIA modem/network combination cards.
- AOL and Compuserve.

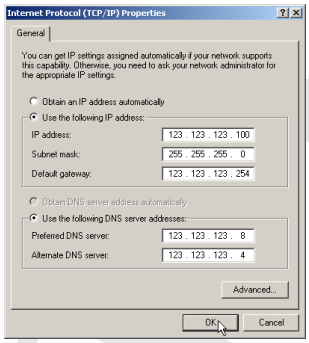
The above methods tend to rely on proprietary software that requires Microsoft Windows. Even if the proprietary software were available for Linux (which it sometimes is these days) it cannot be distributed with EDaL due to licence constraints.

VIII.5.1 Obtaining Internet information from windows

The following procedure roughly describes how to find internet information on Microsoft Windows. Note that the names that you should select may vary slightly on different versions of Windows.






Internet Protocol (TCP/IP) Properties
General
You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.
Obtain an IP address automatically
Use the following IP address:
IP address:
123 . 123 . 123 . 100
Subnet mask:
255 . 255 . 255 . 0
Default gateway:
123 . 123 . 123 . 254
Obtain DNS server address automatically
Use the following DNS server addresses:
Preferred DNS server:
123 . 123 . 123 . 8
Alternate DNS server:
123 . 123 . 123 . 4
Advanced...
OK
Cancel

- Bring up the Network Settings Window. You can reach this by right clicking on "My Network Places" or "Network Neighbourhood" or something with a similar name, and then select "Properties".
- Click on "Local Area Connection" $\Rightarrow$ "Properties"
- Select "Internet Protocol(TCP/IP)" $\Rightarrow$ "Properties"
- Write down the relevant information.

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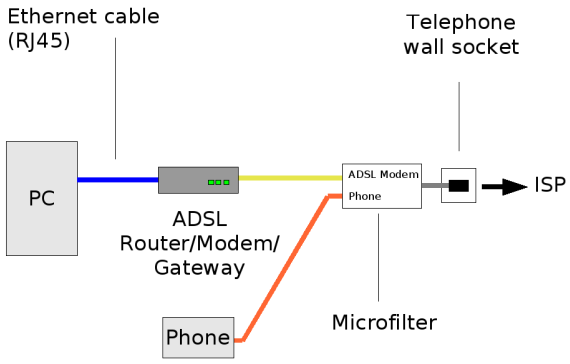
VIII.5.2 ADSL Broadband

A broadband Internet connection lets you download at up to ten times the speed of a conventional modem. It also lets you make and receive voice calls on the same line at the same time. The technical name is Asynchronous Digital Subscriber Line (ADSL). To use ADSL broadband Internet over a conventional phone line with the EDaL system, you need:

1. A telephone line which has been ”activated” for ADSL.
2. An account with a ADSL-enabled Internet Service Provider. This means any ISP that offers a standard broadband service.
3. A microfilter for each standard analogue device (such as telephones, fax machines, and dialup modems).
4. A supported Ethernet adapter in your PC or laptop (see the section ”Connecting to a local area network”).
5. An ADSL router. These popular, inexpensive devices combine a broadband modem with an Ethernet router and gateway, giving ”instant Internet”. The single-port variety is for one computer. Multiport versions let several computers share the same broadband Internet connection.



To make the connection:

1. Make sure the Ethernet cable from the ADSL router is connected to the computer’s Ethernet adapter.
2. Start EDaL. It should detect the network card and then obtain an IP address automatically from the ADSL router.
3. If you have not already done so, use a web browser to visit the ADSL router’s configuration page. Enter the necessary information on the configuration page to make the connection to your ISP (see the information from your ISP)
4. As long as the ”upstream” connection to the Internet is working, you will be connected to the Internet.

Note

The diagram/instructions above shows a typical setup for the UK. It may vary from country to country depending on regulatory requirements. What is most important is that filtering must be done correctly. The ADSL modem must never be subject to filtering, while every other device on the telephone line must be filtered.

The term ”broadband” can also mean Internet provided by cable and other high speed Internet connections (including wireless options). These connections may or may not be usable by the EDaL depending on the interface being compatible and the star-up scrpting being suitable to run from the system.

VIII.5.3 Dial-up

Dial-up Internet is the older, slower way to access the Internet. To connect this way, you need an account with any standard Internet Service Provider and one of the following:

- **External serial modem**. This type of modem connects to the computer’s serial port (called COM1 or COM2 under DOS). No special driver is needed to operate this type of modem, so compatibility with teh EDaL system is excellent. For example, the ”Sitecom External V92 Serial Modem” works perfectly.
- **PCMCIA Cardbus modem**. A PCMCIA Cardbus modem is effectively an external serial modem. In general, the cheaper the card, the better. For example, the ”Sitecom 56Kbps Fax Modem PC Card” works perfectly with EDaL.
- **Internal ISA modem** Like the external modem, this type of modem needs no special driver to make it work. That is why old ISA modems are useful.
- **Internal WinModem** has little dedicated hardware and relies on the host CPU to do the signal processing. Typically these systems work with windows only drivers and will therefore not work with the EDaL system

Connecting using KPPP

The recommended way to obtain an connection with the above modems is is to use ”K Point to Point Protocol” (KPPP):-

1. Select Settings → Network → Ext./Int. Modem will start KPPP
2. Selecting Configure... ”.
3. Click the ”Device” tab.
4. If your modem is plugged into the serial port called ”COM1” in Windows, set ”Modem device” to /dev/ttyS0. If it is plugged into the port called ”COM2” in Windows, select /dev/ttyS1. If you have a PCMCIA Cardbus modem, select /dev/modem. If you have an internal ISA modem, select /dev/ttyS0 first; if that doesn’t work, try up to /dev/ttyS3. (N.B. on some recent systems the modem may appear as /dev/ttyUSBn, where n is a number between 0 - 3)
5. Click the ”Modem” tab.
6. Click ”Query modem”.
7. You should see a response from the modem. If not, go back to step 7 and try another modem device setting.
8. Click the ”Accounts” tab.
9. Click ”New”.
10. Click ”Dialog setup”.

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11. In ”Connection name” enter a name for the connection eg ”test”.
12. Beside ”Phone number”, click ”Add”.
13. Enter your Internet Service Provider’s dial-up access number. If you don’t know, ask your Internet Service Provider. Click OK.
14. Click OK. This will take you back to the accounts screen.
15. Click OK again.
16. Enter your login ID and password. Again, if you don’t know what they are, ask your Internet Service Provider.
17. Click Connect.
18. You should hear the modem work.
19. In a few moments, the KPPP window should shrink down to the Taskbar. It should then read ”00:00” on the Taskbar. This indicates your time online in hours and minutes. Congratulations, you have connected to the Internet successfully.
20. To disconnect, click the KPPP button in the Taskbar.
21. The KPPP window will come back up.
22. Click Disconnect.
23. The phone call will be ended.

VIII.5.4 Setting up Email/News feeds (Icedove)

This section can be ignored if the user collect their mail via a web-mail site, e.g. HotMail, various university/company systems.

The EDaL system uses Icedove, the Debian version of the Mozilla mail client. If the user wished to use it as their standard email reading system it will need to be set-up to collect the mail from the correct server.

The first time Icedove is selected from the menu it will start a wizard with the following steps which are similar to those used to set-up most mail accounts. It should be noted that some items (marked *) may need information that needs to be obtained from the organisation supplying the mail service.

1. **Import Settings and mail Folders From** It is suggested that this option is declined, until the user is sure they wish to move mail clients.
2. **New Account Setup** Icedove allows the user to setup news and newsgroup accounts as well as mail. See the on-line help for more details.
3. **Identity** Enter you real name (and organisation) + email address
4. *__Server Information__ Select the type of server that is intended to be used, most Internet Service Providers use POP (Post Office Protocol).

   As prompted enter the addresses of the ISPs incoming and out going servers.
5. *__User names__ Enter the usernames as supplied by you email provider e.g. ISP).

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6. **Account Name** the system allows for multiple accounts to be setup and a local name to be associated with each, as entered here.

VIII.5.5 User Accounts

The user account The EDaL user account is called ”user”. This account is for almost all productivity tasks, including CD burning and printing. When the X Window System starts, you are logged in to that user account automatically, without a password.

The superuser account The superuser account is for system administration tasks. The superuser account is called the root account. When Knoppix starts, you are logged in as root to all four consoles automatically with no password. It is also possible to use the root account within the X Window System by prefixing commands with sudo, e.g.

```
> sudo ls -l
```

(N.B. Some applications will not work unless run by a superuser. When selected from the start menu the programme will automatically be started as though the user is a superuser. The superuser status will only apply to that particular application and will cease as soon as the application is exited.)

WARNING Important

As with other Linux distributions and computer systems it is best to use the user account for all your everyday tasks. Only use the root account when you need it!

For example, when you are logged on as root (e.g. Superuser), you have the power to instantly delete every file on every disk with one simple command. When you are logged on as a user, the system will not let you do that. This helps you to protect yourself against accidents. Get into the habit now and it will save you later!

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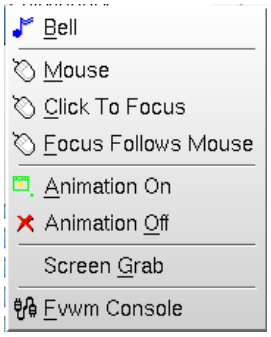
VIII.6 Desktop Configuration

As indicated in section II.3.1 the general configuration of the user interface has been restricted to try and ensure compatibility with documentation and maximum CPU power is available for applications. However, a few standard interface features can be changed and these are accessed via `Start` ⇒ `Settings`

VIII.6.1 Desktop Settings



- **Bell** Set the volume, pitch etc of the system beep
- **mouse** Set the acceleration/handiness of the mouse
- **Click to Focus** Select active window by clicking, brings window to the top.
- **Focus follow Mouse** Give the ability to type in a window without bringing to the top
- **Animation on Off** Animate the opening of windows, default off for greater speed.
- **Screen Grab** Simple screen grabbing routine that is part of the desktop system. A more powerful system can be found in the Gimp (see section III.5)
- **Fvwm Console** Direct access to the window manager's console window for specific modifications to UI.

VIII.6.2 Desktop Themes

The Desktop themes menu has been included to give examples to a user of some of the possible alternative graphical interfaces available via FVWM, should the user wish to develop their own. However it is anticipated that most users will use the default.

The Button/Menu Styles give the user the option of simply changing the style and colours of system buttons and how the menus react.

VIII.6.3 Paging

The way in which the desktop pager reacts is controlled by the menu accessed via Start $Rightarrow$ Settings ⇒ Paging Settings.

The first two icons allow the user to toggle the functionality of keeping the pager window onto of all other windows.

The next four icons set/unset the ability and extent by which windows can be dragged to the edge of an active desktop and then force the window into the adjacent desktop which then becomes active.

N.B. Windows can be moved to specific desktops by selecting the icon at the top right of a window with the right mouse key and selecting the required number.

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VIII.6.4 Save Settings

The save settings option allows the user to save specific windows and application setup data to a file help on a writable disk. The system will initially search all available disks to check if there is a pre-existing version and then prompts the user as to where to write the file or which to overwrite. N.B. This option is not normally used with the USB booted option as the data is automatically stored on the USB key

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VIII.7 Emulators

Running the EDaL system in an emulator is non-ideal as there no universal solution for the problems encountered. There are a number of options available see below, each with their own particular issues with respect to speed, sharing files, hardware resources and interfaces.

VIII.7.1 Qemu

Qemu is the default emulator supplied with the EDaL system and is distributed under the GPL with a home page at *http://bellard.org/qemu/*. Its GPL license and ability to run without installing anything on the host machines means that it is ideal as an initial test/experimental system for a user. However, it slowness means that for any serious work the acceleration extension *kqemu* needs to be installed, see section II.2.3.

As distributed it has limited access to the host filing systems, especially when the host is Windows. The addition of the NFS server, which can be initiated during the Qemu startup, gives the most flexible solution.

Currently

VIII.7.2 Virtual PC

Now available as a free download from Microsoft, the EDaL system has been used with Virtual PC on both Macs and PC's.
(see http://www.microsoft.com/download)

VIII.7.3 VMware

The EDaL system has been used with VMPlayer, however the commercial licence and some difficulties with accessing the host's filing system has resulted in it be currently unsupported.

VIII.7.4 Virtualbox

The EDaL system is known to work reasonably well with the Personal Use and Evaluation license version of VirtualBox, but unfortunately it cannot be distributed. Work is continuing to obtain a stable version of the Open Source Edition. (See http://www.virtualbox.org)

VIII.8 CoLinux

This is an exciting possibility but investigations to date have lead to a unstable system/

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VIII.9 EDaL, Knoppix and Linux

VIII.9.1 What is Knoppix?

Knoppix was created in Germany by Klaus Knopper. Knoppix is a volunteer, co-operative, community effort. It exists entirely on the Internet. At the moment Klaus is the person who does most of the work on the disk, he does get patches and some scripts from the community, but he is still the primary developer.

The Knoppix project is hosted by LinuxTag, which is based in Germany at the Technical University of Kaiserslautern. The LinuxTag team runs conferences, workshops and exhibitions for everyone interested in Linux and Free Software.

Web links The home page of Klaus Knopper: http://www.knopper.net/
The home page of LinuxTag (in German): http://www.linuxtag.org/

VIII.9.2 What is Linux?

Linux (pronounced ”Lin-ucks”) is the kernel. The kernel is the core component of the operating system. Think of an operating system as a nut. The shell is the part that you use. The kernel is the core that talks to the computer’s hardware.

VIII.10 Licences

The EDaL system is constructed to be free using a combination of open source software and documents combined with material developed/released by the project or material for which specific permission has been gained to reproduce/distribute.

The material collated and installed that is nominally ’free’ is covered by a number of licences, all of which meet the Open Source Software intitiative.

GPL	http://www.fsf.org/
LGPL	http://www.fsf.org/
MIT	http://mit.edu
Apache	http://www.apache.org/
LPPL	http://www.latex-project.org/lppl.txt

In addition the open documentation is also released under a number of free licences:

Creative Commons	http://creativecommons.org/
GFDL	http://www.fsf.org/

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Internet connection Details - Tables to store information about internet addresses for commonly used locations.

Location 1 :.....

(Example)	192 . 168 . 123 . 10
IP address	. . .
Subnet mask	. . .
Default Gateway	. . .
DNS Name server(s)	. . .
	. . .

Location 2 :.....

(Example)	192 . 168 . 123 . 10
IP address	. . .
Subnet mask	. . .
Default Gateway	. . .
DNS Name server(s)	. . .
	. . .

Location 3 :.....

(Example)	192 . 168 . 123 . 10
IP address	. . .
Subnet mask	. . .
Default Gateway	. . .
DNS Name server(s)	. . .
	. . .

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- The many students who have help develop and trial ideas/systems.

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The authors would also like to thank Phil Jones for permission to use his 'Knowing KNOPPIX' as a basis for this manual.

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The MDP Engineer's Desktop and Library

The Multidisciplinary Design Project (MDP) Engineer's Desktop and Library (EDal) system is derivative of a Knoppix/Linux Live DVD that has been customised for use by students and engineers working on cross discipline projects. It gives a standard working environment with a wide range of software tools useful for a practicing engineer or student together with a selection of text books, data sheets and technical resources.

The system was developed as part of the MDP, an initiative funded by the Cambridge-MIT Institute to generate a package of information primarily to aid students and teachers undertaking undergraduate projects. The core material was based on a second year course, the Integrated Design Project (IDP), run in the Cambridge University Engineering Department (CUED) and a similar course, 2.007, in the Mechanical Engineering Department of the Massachusetts Institute of Technology (MIT). However, the material has been significantly enhanced and extended by material kindly donated by individuals, organisations and companies around the world.

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The Cambridge-MIT Institute

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